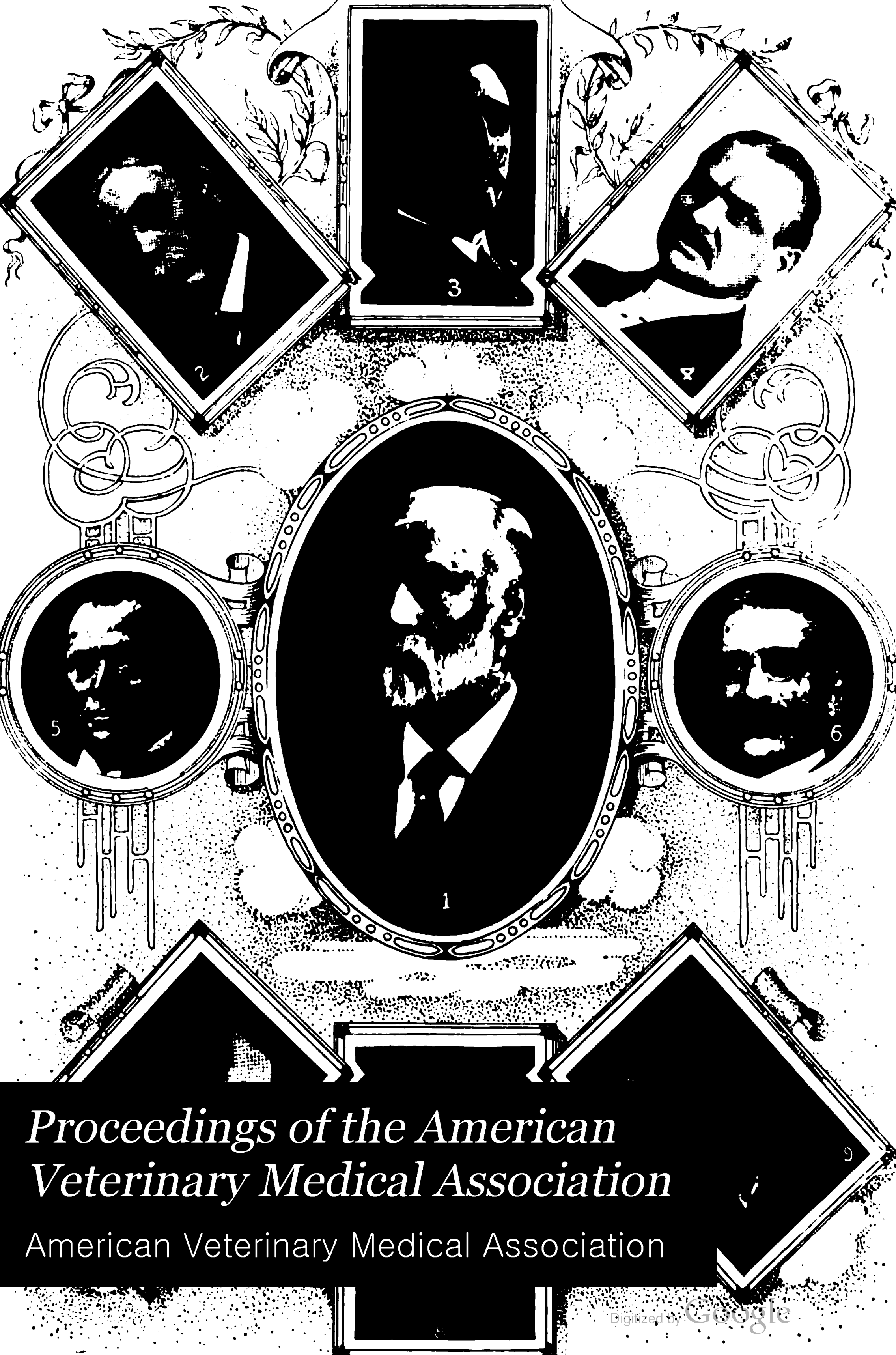
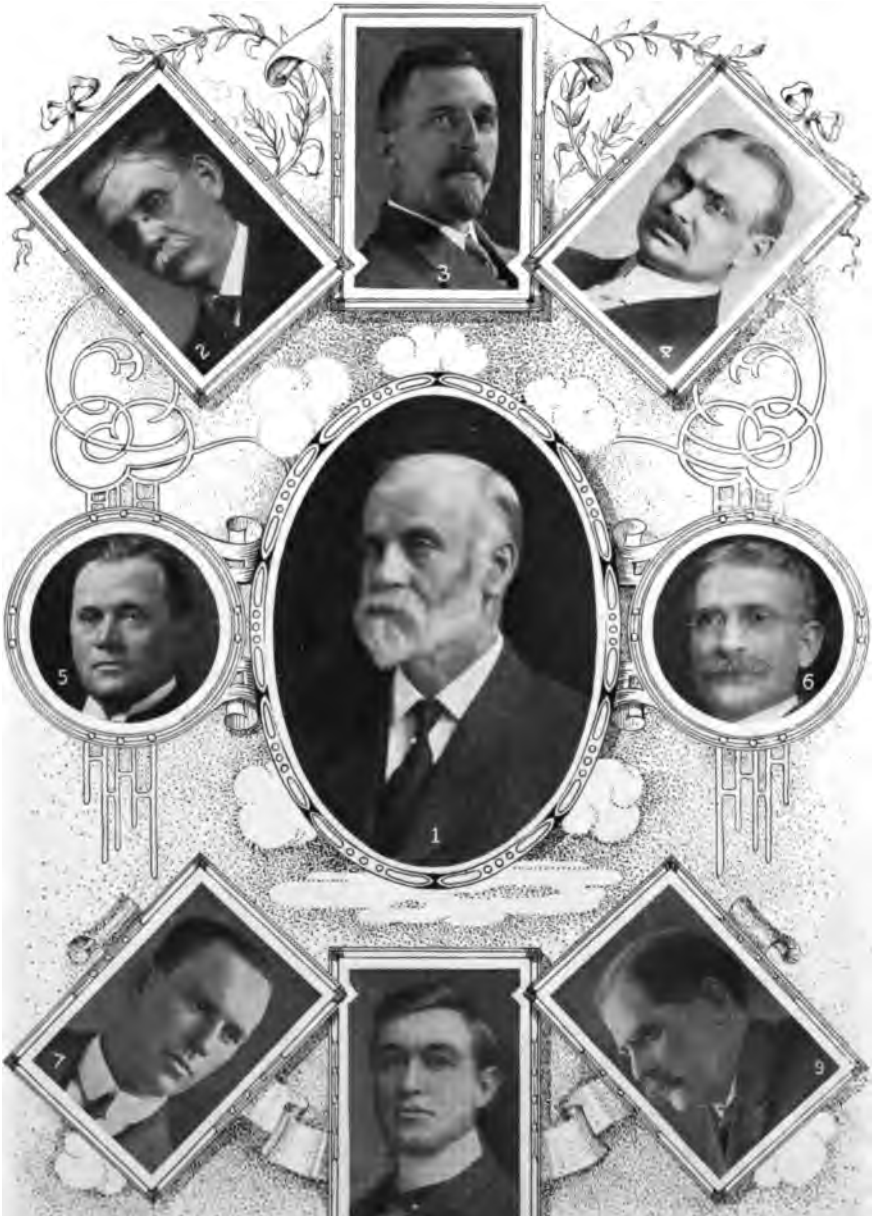


Proceedings of the American Veterinary Medical Association

American Veterinary Medical Association



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7. C. J. MARSHALL — 8 G. R. WHITE — 9. W. L. WILLIAMS

PROCEEDINGS

OF THE

AMERICAN VETERINARY MEDICAL ASSOCIATION

FORTY-NINTH ANNUAL CONVENTION
HELD AT INDIANAPOLIS, INDIANA
AUGUST 27, 28, 29, and 30, 1912

EDITED BY
RICHARD P. LYMAN
CHAIRMAN PUBLICATION COMMITTEE
EAST LANSING, MICHIGAN

LANSING
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1913

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Forty-Ninth Annual Meeting.

OFFICERS, 1911-1912.

President.

S. BRENTON, Detroit, Michigan.

Vice-Presidents.

V. A. MOORE, Ithaca, N. Y.
L. VAN ES, Agricultural College, N. D.
H. JENSEN, Kansas City, Mo.
J. P. TURNER, Washington, D. C.
G. H. ROBERTS, Indianapolis, Ind.

Secretary.

C. J. MARSHALL, Philadelphia, Pa.

Treasurer.

GEORGE R. WHITE, Nashville, Tenn.

Librarian.

W. L. WILLIAMS, Ithaca, N. Y.

COMMITTEES, 1911-1912.

Executive.

E. H. Shepard, *Chairman*,

L. A. Merillat, C. D. McGilvray,
S. B. Nelson, C. G. Lamb,
E. B. Ackerman.

Intelligence and Education.

F. S. Schoenleber, *Chairman*,

E. A. A. Grange, O. L. Boor,
A. T. Kinsley, G. H. Glover.

Diseases.

J. R. Mohler, *Chairman*,

C. H. Higgins, Ward Giltner,
C. E. Cotton, S. H. Burnett.

Legislation.

W. H. Hoskins, *Chairman*,

W. G. Hollingworth, J. R. Mohler,
F. H. Schneider, Jas. Robertson.

Finance.

G. A. Johnson, *Chairman*,

J. J. Joy, A. J. Savage.

Publication.

R. P. Lyman, *Chairman*,

R. W. Ellis, C. J. Marshall,
G. Edward Leech, Geo. B. McKillip.

Necrology.

W. H. Dalrymple, *Chairman*,

A. T. Peters, B. F. Kaupp,
Paul Juckniess, Thomas Thacker.

Resolutions.

S. Stewart, *Chairman,*

A. S. Cooley,
D. F. Fox,
A. H. Baker,
W. L. Williams.

SPECIAL COMMITTEES, 1911-1912.

Special Committee for the 50th Anniversary Celebration.

A. Liautard, *Honorary Chairman,*

J. F. Winchester, *Active Chairman,*

W. L. Williams,
W. H. Hoskins,
William Dougherty,
W. J. Coates,
G. H. Berns,
J. L. Robertson,
E. B. Ackerman,
R. W. Ellis.

International Tuberculosis Commission.

J. G. Rutherford, *Chairman,*

Veranus A. Moore,
John R. Hurty,
John R. Mohler,
Joseph M. Cudahy,
E. C. Schroeder,
T. W. Tomlinson,
J. W. Flavelle,
W. D. Hoard,
W. C. Edwards,
Frederick Torrance,
C. A. Hodgetts,
Mazyck P. Ravenel,

M. H. Reynolds, *Secretary.*

Local Committee on Arrangements.

G. H. Roberts, *Chairman,* Indianapolis, Ind.

Dr. O. L. Boor, Muncie, Ind.
Dr. J. W. Klotz, Noblesville, Ind.
Dr. F. A. Bolser, Newcastle, Ind.
Dr. F. A. Mueller, Indianapolis, Ind.
Dr. W. B. Craig, Indianapolis, Ind.
Dr. R. A. Craig, Lafayette, Ind.
Dr. J. C. Rodger, Anderson, Ind.
Dr. W. J. Armour, Goshen, Ind.
Dr. T. A. Sigler, Greencastle, Ind.
Dr. C. I. Fleming, Terre Haute, Ind.
Dr. W. F. Myers, Ft. Wayne, Ind.
Dr. J. L. Axby, Lawrenceburg, Ind.
Dr. E. M. Bronson, Hartford City, Ind.

RESIDENT SECRETARIES, 1911-1912.

UNITED STATES.

Alabama—I. S. McAdory, Auburn.
Arizona—J. C. Norton, Phoenix.
Arkansas—R. R. Dinwiddie, Fayetteville.
California—David F. Fox, Sacramento.
Colorado—I. E. Newson, Fort Collins.
Connecticut—G. W. Loveland, Torrington.
Delaware—H. P. Eves, Wilmington.
District of Columbia—B. T. Woodward, Washington.
Florida—Thomas J. Mahaffey, Jacksonville.
Georgia—Wm. A. Scott, Columbus.
Idaho—G. E. Noble, Boise City.
Illinois—L. A. Merillat, Chicago.
Indiana—J. W. Klotz, Noblesville.
Iowa—Wm. W. Dimock, Ames.
Kansas—Kirk W. Stouder, Manhattan.
Kentucky—F. E. Eisenman, Louisville.
Louisiana—H. G. Patterson, New Orleans.
Maine—A. Joly, Waterville.
Maryland—Frank H. Mackie, Baltimore.
Massachusetts—Francis Abele, Jr., Quincy.
Michigan—James J. Joy, Detroit.
Minnesota—L. Hay, Faribault.
Mississippi—E. M. Ranck, Natchez.
Missouri—F. F. Brown, Kansas City.
Montana—A. D. Knowles, Livingston.
Nebraska—P. Juckniess, Omaha.
Nevada—W. B. Mack, Reno.
New Hampshire—F. A. Allen, Nashua.
New Jersey—J. P. Lowe, Passaic.
New Mexico—J. C. Norton, Phoenix, Ariz.
New York—John F. DeVine, Goshen.
North Carolina—M. J. Ragland, Salisbury.
North Dakota—W. F. Crewe, Devil's Lake.
Ohio—J. D. Fair, Berlin.
Oklahoma—C. E. Steel, Oklahoma City.
Oregon—W. Dean Wright, Portland.
Pennsylvania—H. Preston Hoskins, Philadelphia.
Philippines—R. F. Knight, Manila.
Porto Rico—T. A. Allen, San Juan.
Rhode Island—T. E. Robinson, Westerly.
South Carolina—L. Friedheim, Rock Hill.
South Dakota—Hubert O. Moore, Edgemont.

Tennessee—M. Jacob, Knoxville.
Texas—Mark Francis, College Station.
Utah—H. J. Frederick, Logan.
Vermont—F. A. Rich, Burlington.
Virginia—George C. Faville, Norfolk.
Washington—A. J. Damman, Ellensburg.
West Virginia—L. N. Reefer, Wheeling.
Wisconsin—W. G. Clark, Marinette.
Wyoming—Otto L. Prien, Laramie.

CANADA.

Nova Scotia—William Jakeman, Glace Bay.
Alberta—J. C. Hargrave, Medicine Hat.
British Columbia—S. F. Tolmie, Victoria.
Saskatchewan—D. S. Tamblyn, Regina.
Manitoba—F. Torrance, Winnipeg.
Ontario—D. McAlpine, Brockville.
Quebec—M. C. Baker, Montreal.
New Brunswick—D. McCuaig, McAdam Junction.
Prince Edward Islands—W. H. Pethick, Charlottetown.

SOUTH AMERICA.

Uruguay—D. E. Salmon, Montevideo.

AUSTRALIA.

Australia—J. Desmond, Adelaide.

Colleges Recognized for 1912-1913.

The following veterinary colleges were endorsed by the Association at the Forty-ninth annual meeting, 1912, as qualifying graduates for eligibility to membership in the Association for 1913:

Alabama Polytechnic Institute, Veterinary Department,
American Veterinary College,
Chicago Veterinary College,
Cincinnati Veterinary College,
Colorado State Agricultural College, Veterinary Division,
Columbia Veterinary College,
Detroit Medical College, Veterinary Department,
Foreign Recognized Veterinary Schools,
George Washington University, Veterinary Department,
Grand Rapids Veterinary College, graduates of '06-07-08-11-12-13,
Harvard University, Veterinary Department,
Indiana Veterinary College,
Iowa State College, Veterinary Division,
Kansas City Veterinary College,
Kansas State Agricultural College, Veterinary Division,
Laval University, Veterinary Department,
McGill University, Veterinary Department,
McKillip Veterinary College,
National Veterinary College,
New York-American Veterinary College,
New York College of Veterinary Surgeons,
New York State Veterinary College,
Ohio State University, Veterinary Department,
Ohio Veterinary College,
Ontario Veterinary College, exempt graduates of '09,
Royal College of Veterinary Surgeons of Great Britain and Ireland,
San Francisco Veterinary College,
Terre Haute Veterinary College.,
University of California, Veterinary Department,
University of Pennsylvania, School of Veterinary Medicine,
Washington State College, Veterinary Division.

CONSTITUTION AND BY-LAWS OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION.

(Revised August, 1912.)

CONSTITUTION.

Article I. Name.

This Association shall be known as the American Veterinary Medical Association. It shall consist of active and honorary members.

Article II. Objects.

The objects of this Association are to promote good fellowship; to elevate the standards of veterinary education; to cultivate medical science and literature; to enlighten and direct public opinion regarding veterinary problems of state medicine; to protect the material interests of the veterinary profession and present to the world its achievements.

Article III. Officers, etc.

Section 1.—The officers of this Association shall be a President, five Vice-Presidents, a Secretary, a Treasurer and a Librarian. These officers, except the Librarian, shall be elected by ballot at each annual meeting, and a majority of all votes cast shall be necessary to a choice. The term of said officers shall be one year or until their successors are chosen. They shall, without delay, transfer to their successors all property belonging to the Association.

Section 2.—The President, the five Vice-Presidents, the Secretary and the Treasurer, together with six members to be appointed annually by the President, shall constitute the Executive Committee. The President shall designate one of the members as Chairman of said committee.

Section 3.—The duties of officers, requisites of membership, times of annual or other meetings of this Association, and such regulations as may be necessary for the government of the same, shall be provided for in the By-Laws.

BY-LAWS.

Article I. President.

Section 1.—It shall be the duty of the President to preside at all meetings of the Association, to preserve order and decorum, and to present

an address at the annual meeting following his election. The President's address shall be referred to the Executive Committee for such consideration and action as may by said committee be deemed advisable. The President shall not be eligible for re-election so as to serve two successive terms.

SECTION 2.—The President shall have power to order the payment of bills that may be presented to the Secretary during the year prior to the annual meeting, if, in the judgment of the Secretary, said bills are true and correct, and the President deems it advisable to make immediate payment.

SECTION 3.—He shall have power to temporarily fill vacancies that may occur in the elective offices; he shall appoint all committees unless otherwise ordered by the Association, and shall perform all the duties prescribed by the By-Laws and Resolutions of the Association.

SECTION 4.—He shall annually appoint Resident Secretaries who shall perform such duties as are herein assigned to them.

SECTION 5.—He shall have power to rescind appointment of members of committees or of Resident Secretaries pending investigation by the Executive Committee, if, in his opinion, such party has violated the code of ethics of the Association.

SECTION 6.—He shall have no vote except on questions where the votes are equally divided and in the election of officers.

SECTION 7.—He shall keep on file all official documents relating to the Association that may come into his care.

ARTICLE II. VICE-PRESIDENTS.

It shall be the duty of the Vice-Presidents, in the order of their elective seniority, to perform the duties of the President in case of the latter's absence, or inability to serve or conduct the affairs of the Association. They shall otherwise assist the President as he may from time to time determine.

ARTICLE III. SECRETARY.

SECTION 1.—The Secretary shall keep the records of the proceedings of the Association. He shall receive all applications for membership. all fees and dues, and shall pay over all moneys to the Treasurer at least once in three months. He shall give security for the trust imposed in him.

SECTION 2.—It shall be the duty of the Secretary to notify each candidate of the receipt of his application for membership and transmit to him a copy of the Constitution and By-Laws. calling attention to the first, second, third and fourth Sections of Article X of the By-Laws.

SECTION 3.—He shall notify, in writing, the Chairman and other members of all committees of their appointment by the President or by the Association, giving the name, duties and membership of the committee; he shall also notify each Resident Secretary of his appointment, and shall perform such other duties as may be assigned to him.

SECTION 4.—He shall publish in each report of the proceedings of the

annual meeting of the Association a list of officers, regular committees, honor, active and honorary members, with their address.

SECTION 5.—The Secretary shall receive an annual salary of five hundred dollars and such expenditures as may be necessary in attendance at the annual meeting following his election.

ARTICLE IV. TREASURER.

SECTION 1.—The Treasurer shall receive and have charge of the funds of the Association, and shall give security to the amount of one thousand ($1,000.00) dollars for the trust imposed in him.

SECTION 2.—It shall be the duty of the Treasurer to put all the moneys of the Association into one fund to be appropriated for the payment of current expenses and for such other uses as the Association may direct.

SECTION 3.—He shall pay all bills which come into his hands duly approved by the President and Secretary.

SECTION 4.—At each annual meeting he shall give a detailed statement of all his official receipts and disbursements, which statement must be duly audited and signed by the Committee on Finance.

ARTICLE V. LIBRARIAN.

SECTION 1.—The Librarian shall receive and have charge of all documents, files and published annual proceedings and other properties belonging to the Association submitted to him by the Association or its officers. He shall be elected by ballot and continue in office until his successor is chosen. He shall not, unless otherwise appointed, constitute a member of the Executive Committee.

ARTICLE VI. EXECUTIVE COMMITTEE.

SECTION 1.—The Executive Committee shall meet on the day previous to the opening of the annual meeting of the Association and shall hold such adjourned meetings as the business of the Association may require.

SECTION 2.—The President may call a special meeting of the Executive Committee whenever he shall deem it necessary.

SECTION 3.—A majority of the committee shall constitute a quorum for the transaction of business. Any vacancy due to the absence of an appointed member, whenever a quorum is lacking, shall be temporarily filled by the President, acting Vice-President, or in their absence, by the Chairman of the Committee.

SECTION 4.—The records of the proceedings of the Executive Committee shall be kept by the Secretary.

SECTION 5.—The Executive Committee shall be invested with power to hear and determine upon complaints filed before it in writing relative to the improper conduct of any member of the Association, and shall, if thought advisable, summon the member so charged to appear before it at the next annual meeting of the Association to answer the charges and make defense. If the Committee, after fair and impartial trial at the

said next annual meeting, finds the defendant guilty of all or part of the offense as charged, said Executive Committee shall report to the Association a summary of the charges and evidence submitted on both sides, together with such recommendation as may by said committee be deemed wise; but no public report of such charges or evidence shall be made by the Executive Committee or by any member thereof until after trial of the accused member.

SECTION 6.—The Executive Committee shall annually submit to the Association a list of all veterinary institutions, whether then operating or not, whose graduates shall be recommended as eligible to membership; further, shall execute such other duties as the Association may direct.

ARTICLE VII. COMMITTEES.

SECTION 1.—The regular committees of the Association, in addition to the Executive, shall be as follows, and the members of each regular committee shall be appointed by the President at each annual meeting or as soon thereafter as may be practicable.

Committee on Intelligence and Education, five members.

Committee on Diseases, five members.

Committee on Legislation, five members.

Committee on Finance, three members.

Committee on Publication, five members.

Committee on Local Arrangements, number of members at option of President.

Committee on Necrology, five members.

Committee on Resolutions, five members.

SECTION 2.—It shall be the duty of the Committee on Intelligence and Education to collect, and, at each annual meeting, present to the Association information relative to veterinary sanitary work, recent veterinary facts and intelligence and veterinary legislation. It shall be within the province of this committee to inquire into the entrance requirements, curricula and educational methods of veterinary colleges, and to report to the Association such suggestions and criticisms concerning the same, as it may deem advisable.

SECTION 3.—It shall be the duty of the Committee on Diseases to investigate the character and extent of prevalent diseases throughout America and report upon the same at each meeting of the Association.

SECTION 4.—It shall be the duty of the Committee on Legislation to use its best efforts to secure the enactment or the defeat of such legislation as the Association directs.

SECTION 5.—It shall be the duty of the Committee on Finance to audit the financial records of the Secretary's and Treasurer's accounts. This committee shall also devise ways and means to raise funds, when necessary, to meet the expenditures of the Association, and shall report its proceedings at each annual meeting.

SECTION 6.—It shall be the duty of the Committtee on Publication to make all necessary arrangements for reporting the meetings of the Asso-

ciation. Said committee shall have charge of the publication of all reported proceedings, papers, reports and other documents submitted to it by the Association. It shall be authorized to make summaries of such local and other addresses as have not permanent scientific value and to summarize discussions of business and other matters that come before the Association when thought advisable by the committee. All bills incurred by the Committee on Publication must be first approved by the Chairman of said committee, and shall then follow the regular course as for other bills.

SECTION 7.—It shall be the duty of the Committee on Local Arrangements to make such local arrangements as may be necessary for the success of the meetings of the Association, to furnish for publication in the annual report of proceedings a suitable account of the clinic and entertainment, and to assist the President and Secretary as they may direct.

SECTION 8.—It shall be the duty of the Committee on Necrology to prepare and present memorials of deceased members.

SECTION 9.—It shall be the duty of the Committee on Resolutions to consider all resolutions which may be referred to it by the Association and report the same, together with such other resolutions as it may deem wise.

SECTION 10.—Each Resident Secretary shall annually submit to the Committee on Intelligence and Education a report concerning recent veterinary facts and prevalent diseases within his jurisdiction and shall aid the President and Secretary by the performance of such other duties as they may direct.

SECTION 11.—The President and Secretary shall be *ex-officio* members of the several regular committees, except the Committee on Publication, of which the Secretary shall be an active member. The President shall have power to convene any of the various committees whenever, in his judgment, such action shall be necessary.

SECTION 12.—COMMITTEE ON NOMINATION. The President and all ex-presidents in attendance at any annual meeting of this Association shall constitute a Committee on Nominations. It shall be the duty of this committee to elect a chairman and through him to prepare and present to the Association, in alphabetical order, the names of not less than three candidates for President, not less than ten candidates for Vice-Presidents, not less than two candidates for Secretary, and not less than two candidates for Treasurer, for the ensuing year. This report shall not bar nominations from the floor, which shall be in order immediately following the presentation and acceptance of the report of the Committee on Nominations. If, at any annual meeting, less than three ex-Presidents are in attendance, all nominations for elective officers for the ensuing year shall be made from the floor.

Article VIII. Candidates for Membership.

Section 1.—Each application for membership shall be submitted in the applicant's own handwriting upon one of the application blanks of the Association, and be duly vouched for in their own handwriting by two active members of the Association in good standing, resident in the applicant's state or province, or by the President and Secretary of the Association. The application must be accompanied by eight (8) dollars to cover the membership fee and first year's dues, which sum shall be returned to the applicant should he fail of election to membership.

Section 2.—Except as provided in Sections three and four of this Article only those veterinarians may be admitted to active membership who have spent not less than three collegiate years in the study of veterinary medicine, and have been duly graduated from an accredited veterinary college conforming to the following requirements:

A. Matriculation equivalent to requirements for admission to a recognized high school. Matriculation to a recognized veterinary college shall be one year of high school work or its equivalent, beginning with the term of 1914-1915, and that the requirement be raised to two years of high school work, parts of different calendar years, or its equivalent, beginning with the session of 1918-1919.

B. A curriculum of not less than three collegiate years, of not less than seven months each especially devoted to the study of veterinary science. Beginning with the session of 1914-1915, the curriculum shall cover a period of not less than twenty-four months of not less than three collegiate years devoted to special study of veterinary science.

C. A faculty consisting of not less than five veterinarians eligible to membership in this Association.

Section 3.—This Association will admit to active membership graduates from any four-year course agricultural college, who have been regularly graduated from a recognized veterinary college and allowed therein one year's credit for the agricultural course, provided said agricultural course includes in its curriculum sufficient veterinary science given under a qualified veterinarian.

Section 4.—A veterinarian, graduate of a veterinary college which, at the time of his graduation, did not maintain educational standards in conformity with the active membership requirements of this Association, may, upon recommendation of the Executive Committee, be elected to membership, provided he has been duly graduated not less than five years prior to the date of application, and further, that the college has ceased to graduate veterinarians contrary to the standards now fixed by this Association.

Section 5.—The following shall be the form of application blank:

APPLICATION FOR MEMBERSHIP.

REQUIREMENTS FOR ADMISSION TO MEMBERSHIP.

EXTRACTS FROM BY-LAWS.

(Here quote Sections 1 to 5, Article VIII.)

To the American Veterinary Medical Association:

....
(Date)

I hereby make application for membership in your Association. My age is ....years. I was graduated from ....in the
(Name of Veterinary School)
year ....

My preliminary education was as follows:............................
I spent .... months in actual attendance at each of the following veterinary colleges: ....

My residence is ....
(Post Office) (State or Province)

....
(Name in full) (Degree)

We, the undersigned vouchers, hereby certify that by reason of personal acquaintance or other reliable information, consider the above-named applicant a man of good moral character and reputable business methods.

.... (Name) (Degree) .... (Name) (Degree)	*Members of the American Veterinary Medical Association.*

SECTION 6.—All applications for reinstatment to membership shall be submitted upon the form prescribed in Section four; shall be accompanied by nine dollars ($9.00) to cover the six dollars ($6.00) obligated at the time of suspension, and one year's dues in advance, and this sum shall be returned to the applicant should he fail of reinstatement to membership. All those obtaining their active membership by reinstatement shall within one year, sign the Constitution and By-Laws, as provided in Section ten of this Article.

SECTION 7.—All candidates reported favorably by the Executive Committee shall be balloted for by the Association. Those receiving a two-thirds vote of the members present shall become members of the Association upon signing the Constitution and By-Laws, as provided in Section nine.

SECTION 8.—Applications adversely considered shall not again be entertained until the next annual meeting.

SECTION 9.—A member-elect shall within one year sign the Constitution and By-Laws and be thereupon entitled to a membership card of active membership. If he fails to comply with this provision, he shall cease to be a member-elect.

SECTION 10.—Members who have been in active membership for twenty-five consecutive years and continuously thereafter until death or honorable withdrawal from the Association, shall be eligible to an Honor Roll of the Association, and shall be exempt from dues. It shall be the duty of the Secretary to report the names of members who are eligible to this list at each annual meeting of the Association. The list shall be referred to the Executive Committee for consideration and recommendation.

ARTICLE IX. HONORARY MEMBERS.

SECTION 1.—Any member may propose a candidate for honorary membership, the rank or station held by such candidate being stated in writing. The proposal shall be referred to the Executive Committee and considered by this committee at its next meeting. The Executive Committee shall then report its action upon said proposal to the Association, and, if favorably recommended, the person shall be balloted for by the Association at a subsequent session. A majority of votes cast shall constitute him an honorary member.

SECTION 2.—Not more than three honorary members shall be elected in any one year.

SECTION 3.—Honorary members may take part in debate, but shall not be entitled to vote.

SECTION 4.—The President of the United States shall be *ex-officio* an honorary member during his term of office.

SECTION 5.—The following shall be the form of certificate for honorary members:

This is to certify that the American Veterinary Medical Association has received .... as an honorary member.

In witness whereof, these presents are signed by the President and Secretary and sealed by our common seal this..........day of..........

.......................President.

.......................Secretary.

ARTICLE X. CONTRIBUTIONS AND ARREARS.

SECTION 1.—The active membership fee of this Association shall be five dollars.

SECTION 2.—The yearly dues of the Association shall be three dollars, payable in advance.

SECTION 3.—The Association, at an annual meeting, may assess such amounts as may be requisite to meet the necessary expenses.

SECTION 4.—Any member eighteen months in arrears shall be notified

twice by the Secretary within six months, and if the arrears are not paid before the next annual meeting of the Association, the Secretary shall report said delinquent to the Executive Committee for consideration of the question of suspension from membership.

ARTICLE XI. ORDER OF BUSINESS.

Roll call.
Submission of the minutes of the previous meeting as presented in the annual report and in other records kept by the Secretary.
Unfinished business.
President's address.
Report of the Executive Committee.
Admission of new members.
Reports and discussions of other regular committees.
Reports and discussions of special committees.
Reports of officers.
New business.
Papers and discussion.
Election of officers.
Installation of officers.
Adjournment.

ARTICLE XII. MEETINGS.

SECTION 1.—The date and place of the annual meeting of the Association shall be determined by the Executive Committee. It shall be convened not earlier than August fifteenth nor later than the first Tuesday in September of each year, unless otherwise ordered by a two-thirds vote of the members of the Association, and notice of the selection shall be given to each member by the Secretary at least sixty days before the date of the meeting.

SECTION 2.—Special meetings shall be called by the President, or in his absence, by the ranking Vice-President, upon the written request of ten members who shall specify the particular object of such meeting. A notice of such special meeting and its object shall be given at least one month before said meeting. The President is also authorized to call meetings at his discretion, the active members being duly notified as above.

SECTION 3.—At a special meeting no other business than that which shall have been specified in the requisition and in the published call for the meeting shall be transacted.

SECTION 4.—Twenty-five members shall constitute a quorum for the transaction of business, and a quorum shall always be presumed present at annual meetings unless an actual count be called for.

SECTION 5.—In the absence of the President and Vice-Presidents, the senior past President present shall preside. In case none of these should be present the Association shall elect a President pro-tempore from the floor.

SECTION 6.—Every member shall observe order and decorum in the

Association meeting, and shall pay due respect to the President and other officers and to his fellow-members.

SECTION 7.—All questions of order not specially provided for shall be decided by the usual parliamentary rules, Robert's Rules of Order being taken as the guide and standard.

SECTION 8.—Unless otherwise ordered by the President, the work of the Association shall be divided into three daily sessions, viz.: from 10 a. m. to 12 m., 2 to 5 p. m., and 8 to 10 p. m.

Papers shall not consume in reading more than twenty minutes. Each discussion shall be confined strictly to the subjects of the paper or report before the Association. Each speaker shall be limited to ten minutes, and shall not speak a second time until all members who desire to speak shall have had an opportunity to do so. A member speaking the second time in the same discussion shall be limited to five minutes except by unanimous consent.

SECTION 9.—All resolutions presented to the Association shall be in writing and be referred without discussion to the Committee on Resolutions.

ARTICLE XIII. CODE OF ETHICS.

SECTION 1.—Members of this Association are expected to conduct themselves at all times as professional gentlemen. Any flagrant violation of this principle shall be considered by this Association as a violation of this code and may subject the violator to suspension or expulsion.

SECTION 2.—No member shall assume a title to which he has not a just claim.

SECTION 3.—No member shall endeavor to build up a practice by undercharging another practitioner.

SECTION 4.—It shall be considered a breach of the code of ethics for a member to assail the professional reputation of a fellow practitioner, particularly for his own individual advancement.

SECTION 5.—In all cases of consultations it shall be the duty of the veterinary surgeon in attendance upon the case to give the opinion of the consulting veterinary surgeon (whether favorable to his own or otherwise) to the owner of the patient in the presence of all three. In case of the absence of the owner the veterinary surgeon consulted may, after giving his opinion to the attending veterinary surgeon, transmit it in writing to the owner through the medical attendant. It shall be deemed a breach of this code for a consulting veterinary surgeon to revisit a patient without a special invitation by the attending veterinary surgeon or agreement with him.

SECTION 6.—In advertising, the veterinary surgeon shall confine himself to his business address. Advertising specific medicines, specific plans of treatment, or advertising through the medium of posters, illustrated stationery, newspaper puffs, etc., will not be countenanced by this Association.

SECTION 7.—Any person who shall advertise or otherwise offer to the public any medicine, the composition of which he refuses to disclose, or

who proposes to cure disease by secret medicines, shall be deemed unworthy of membership in this Association.

SECTION 8.—It shall be deemed a violation of the code of ethics for any member of this Association to contract with or through the officers of any live stock insurance company for the professional treatment of the members' stock so insured; but this rule shall not prevent any member from becoming an examiner of risks and acting in the capacity of an expert for the same.

SECTION 9.—Each member shall observe the code of ethics adopted by this Association, and the President shall have power to summon any member to appear before the Executive Committee to answer charges for breach of the same.

ARTICLE XIV. SUSPENSION AND ALTERATION OF CONSTITUTION AND BY-LAWS.

SECTION 1.—Any motion for suspension of any article of the Constitution or the By-Laws, excepting as herein provided, must be offered in writing, be signed by the party making the motion, and must be adopted by a two-thirds vote of members present.

SECTION 2.—A By-Law may be suspended only for the purpose of facilitating important business of the Association, and the suspension must be of such a character that it cannot interfere with the vested rights or privileges of any member.

SECTION 3.—A suspension of the By-Laws may be made by unanimous consent of any meeting of the Association for the election of active or honorary members.

SECTION 4.—A suspension of the By-Laws may be made by a two-thirds majority for the purpose of changing the order of business.

SECTION 5.—All proposals for alterations or amendments of the Constitution or By-Laws shall be offered in writing. No alteration proposed shall be acted upon until it has been referred to the Executive Committee and presented anew by them to the Association. All members shall be notified at least ten days previous to any action thereon, and no alteration or amendment shall become effective except by a two-thirds vote of the members present at the time of the stated meeting.

Proceedings of the Forty-ninth Annual Convention

OF THE

American Veterinary Medical Association.

TUESDAY MORNING,
August 27, 1912.

GENERAL SESSION.

The forty-ninth annual meeting of the American Veterinary Medical Association was called to order at the German House, Indianapolis, Indiana, at 10:15 a. m., President S. Brenton in the chair.

PRESIDENT S. BRENTON: *Ladies and Gentlemen and Fellow Members:* I am very glad to see so many here at our opening session, this morning; and I now declare the forty-ninth annual meeting of the American Veterinary Medical Association called to order. I take great pleasure in introducing Honorable ex-Mayor Charles Bookwalter, of Indianapolis, who will give you a welcome to this city.

ADDRESS OF WELCOME.

BY HONORABLE CHARLES BOOKWALTER,
Ex-Mayor of Indianapolis, Indiana.

Mr. President, Ladies and Gentlemen:

I feel as though this will be a memorable day in my life. First, because I am permitted to stand in a position which should have been occupied by the distinguished ex-Vice-President of the United States, a resident of our good city, who unfortunately has been called out of town. I feel that first of all it is essential to apologize for the great descent which naturally comes from the ex-vice-president down to the ex-mayor; the chasm is so broad

that it will not take the fervid imagination of a horse-doctor to conceive of my performing the function this morning. However, I can only do the best possible under the circumstances.

Secondly, it is a memorable day to me because I have this morning been asked to address this distinguished gathering of not less than five hundred representatives of your profession from all sections of the country, and because I have been initiated, at least in the first degree, into the presence of so many surgical instruments, which to me is an education in itself, and modesty compels me to confess that the only one, the use of which I thoroughly understand, was the one with which I was presented. It is a very convenient instrument, in the use of which all of us have been educated, and which many of you recognize has a very broad application. For the benefit of the members of the press who are present, I would say that I was informed that it was a bottle-opener. (Laughter.) I presume that is not the proper name for it and that its use is not confined to any one particular kind of bottles, but you know how it is, somehow or other the Hoosier mind always associates a thing of that sort with a particular brand. I have been educated in the use of this delicate little instrument, which is so convenient at times, and the absence of which is so embarrassing whenever an emergency presents itself.

On looking out at this audience before me, I am ready to realize what a far reaching step forward has been taken since the days of my boyhood; especially upon comparing the personnel of this with the old-fashioned horse-doctor, who used to visit my father's farm to take care of the horses on our place when he was not otherwise occupied in treating the "stills," and he seemed to be generally recognized in the community as a sort of one day still himself. Coming here today, and finding gathered in Indianapolis this great body of hundreds of men, who have dedicated their lives to this science, I am indeed forced to the conclusion that the world is progressing along other lines than those referred to by the political speakers of the present day. Indianapolis is so much accustomed to entertaining conventions that it requires one of unusual character to break a ripple on the surface, but I must admit to you, that you have gathered here in our capital city a magnificent representation of this new profession and that it is indeed an eye-opener to all of us.

When informed some few months ago that this American

Association was to hold its meeting here, the scope and magnitude of the gathering did not at any time impress itself upon our minds, but since we have seen the things which we have today, and heard the remarkable statements which have been made, as to the progress of your great profession, we are forced to a realization of the importance of this great profession; indeed, it becomes a pleasure and a delight to the people of the Hoosier capital, not only to welcome you here, but to know that you have selected our home town as the place for your gathering.

A veterinary surgeon, in my mind, occupies a rather unique position before the American people. Some eight or nine years ago, a mechanical genius of our land invented a horseless vehicle, and immediately there arose up prophets upon all sides, none of whom have proven themselves to have been a seventh son, or to have been born with a veil, gentlemen who said that the day of the horse had ceased, and that it would only be a limited number of years before vehicles propelled by horses would be such a scarcity as was the automobile when it started to run through the streets of this city, along in '98 and '99. In spite of these direful prophesies, however, the use of the horse remains with us today, and I imagine will continue to remain as long as these great American people continue to be an agricultural people, because agriculture is the very basis of the prosperity of our land, and agriculture without the use of the horse could scarcely be carried on; consequently, the veterinary surgeon will remain with us as long as the draft horse is a necessity in our commercial life, and as long as the pet is to be found about the household. I well understand and appreciate how serious a matter it has become where the household has become wedded to a particular pet, and we wake up some morning, to find that there is something the matter with that particular pet, something which requires the attention of a veterinarian. If that pet is sick, it is almost a dead race to see how quickly we can get to the telephone to summon this or that professional man to alleviate the sufferings of the animal that means so much to the household. I am not comparing a household pet of that kind to the partner of my sorrows, it is only given as a relative illustration to demonstrate to you that so long as the American people continue to be a people who have some natural and wholesome impulses manifested in the love of dogs, ponies, and our other domestic

animals which we have about the household, just so long will there be a demand for men of this profession.

Any following in life of importance, and any profession has a commercial side represented by manufacturing and showing a great amount of inventive genius, skill and brains as that given to the careful manufacture of these beautiful instruments such as are on display down stairs this morning. These alone are evidences, not only that the profession has come to stay, but has come to be developed into a calling which knows the needs of the live stock interests and demands the respect of the people of this country.

I am glad indeed that you have come to Indianapolis. It is a beautiful city and we trust that you all may have an opportunity to visit its beauties while you are present with us during the coming week; moreover, we want you to feel that the hearts and homes of our people are open to you, and we extend to you in the broadest sense, a true, genuine, and hearty Hoosier welcome.

I thank you. (Applause.)

President Brenton: It gives me great pleasure to call upon Dr. Rutherford, one of our members, who will respond on behalf of the Association, to this very cordial address of welcome.

RESPONSE TO ADDRESS OF WELCOME.

By Dr. J. G. Rutherford,

Calgary, Canada.

Mr. President, Mr. Bookwalter, Ladies and Gentlemen:

It certainly gives me a great deal of pleasure to have an opportunity on this occasion to reply to so genial an address as that which we have just heard this morning from Mr. Bookwalter. I came all the way down here from Calgary, Alberta, at the base of the Rocky Mountains, to reply to the address of welcome which was to have been delivered on this occasion by ex-Vice-President Fairbanks, of the United States, and I have heard one or two expressions of regret, during the last few hours, on account of the fact that that distinguished gentleman was not able to be with us. Surely all regrets must have been completely obliterated by the exceeding geniality and cordiality of this address from Mr. Bookwalter to which we have all listened this morning. I

feel sure that if the distinguished statesman had been here he could hardly have made a speech which would make us feel more thoroughly at home, than has the gentleman who took his place this morning. After all, that is the most important purpose and object of an address of welcome,—to make people feel at home in the city in which they happen to be for the time being, and we certainly have no reason to regret, but rather every reason to congratulate ourselves upon our good fortune in the selection of ex-Mayor Bookwalter to deliver the address of welcome to us this morning. We reciprocate very much indeed his friendly and cordial remarks.

It occurred to me as he spoke of the partner of his sorrows, that if we are to be looked upon as judges, and that if his speech to us this morning is any sample of his usual manner of address, it would be much more appropriate to speak of the partner of his joys, for I am satisfied that Mr. Bookwalter has much more joy than sorrow in the relation to which he referred. If that were not the case, he certainly would not have been able to deliver so genial and appropriate a talk as he has given us this morning.

He spoke of the progress of the veterinary profession, and in a few brief words contrasted the difference between the old horse doctor and the modern veterinarian. He appealed to my personal memories, because some thirty-two years ago, I wandered down here into the state of Indiana from the wilds of Canada, and commenced the practice of my profession, in what is now one of the most prominent cities of this Hoosier state. I can fully substantiate Mr. Bookwalter's memories because I think the conditions to which he referred were quite common about that time. When I came to Indiana, although, of course, owning and using the title of "Veterinary Surgeon," I found that nobody knew what it meant. (Laughter.) There was in the town in which I located, a gentleman who had a sign on his place of business which described him as a "Praktikle Horse Dokter" and who was one of the old-fashioned type to which the mayor referred. Apart from my professional incongruity with the surroundings I was looked upon as rather a curiosity in other ways. I had the only bowler hat in a town of about twelve thousand inhabitants, the only standup collar, the only pair of side whiskers and the only tight Bedford cord riding trousers, then as now, so much worn in the old country by the younger members of the

profession and by horsey men generally. Altogether I was considerably in advance of my time. (Laughter.)

One day an old chap, a rather dignified implement agent who had once been at the east and who therefore always wore a top-hat and Prince Albert coat, although he used but one shirt a week and never donned a collar, said to me, "Doc, where did you come from, anyway?" I replied "from Canada." "Well," said he, "That aint much of a place." (Laughter.) "I was down to Niagara Falls once on an excursion, and saw a place acrost a bridge, and said to somebody, 'What place is that?' They said it was Canada. So, I went over and walked all over the dog-goned place, it didn't amount to nothing." (Laughter.)

I came from Canada, and as you can see, the old fellow's opinion of the place from which I immigrated was not very favorable. Between his opinion and that of the townspeople, who as I have indicated, looked upon me as something of a freak, I can quite substantiate what Mr. Bookwalter has said this morning about the profession in his early days, and rather think from his description that the gentleman who used to visit his father's farm, was rather superior to the general run of veterinarians in that day. We have progressed until we are at the present time a very substantial, a very reputable and a very respectable profession. We are still improving. Another thing,—we are able to corroborate the statement which Mr. Bookwalter made this morning as to the fact that we are not going out of existence for quite a while yet, and that most of us who are in the profession today will probably die in it, unless we make a mistake and get into politics, either municipal or federal, in which case the end can readily be foreseen. (Laughter.)

There is, of course, a phase of our professional work which Mr. Bookwalter did not touch upon, namely: that of veterinary sanitation. That particular phase of our work as you all know, is coming to play a very important part in the practice of veterinary medicine. While we all appreciate very much indeed the kindly remarks of Mr. Bookwalter with reference to the household pet and hope that domestic pets will be a long time in dying out of the hearts of the American people. We claim that in veterinary sanitary science and particularly in that aspect of it which has to do with the safeguarding of the food supply, we have and are likely long to have a field of even greater usefulness

than is to be found in ministering to the ailments of our animal friends.

I was greatly impressed with Mr. Bookwalter's reference to the little souvenir which he received down stairs this morning, and felt when he told of the various uses to which the little implement could be put, that perhaps he ought to be given a word of warning, and not being at all sure of an opportunity to give it to him privately, I may be justified in taking this big audience into my confidence. We want him to avoid, if possible, the unfortunate mishap which occurred to a fellow countryman of mine who was on a trip away from home. On returning, his wife said to him—"John, did you enjoy your trip?" "Oh," he said, "It was a grand trip, if I had not lost my luggage." "Lost your luggage—but how did that happen?" she said. "The cork cam oot." (Laughter.)

Now then, ladies and gentlemen, we certainly appreciate to the full the very kindly and hearty welcome which we have had this morning. A good many of us have had in common opportunity of listening to many addresses of welcome in various parts of this continent. They have all been nice and friendly and have all been appreciated by the members of the American Veterinary Medical Association, but I have no hesitation in saying that the address Mr. Bookwalter has given to us this morning will stand out even among the considerable number of eloquent, friendly and kindly addresses to which we have listened in the different places in which our conventions have been held, as one of the best, if not the very best. (Applause.)

On behalf of this Association, Mr. Bookwalter, I desire to convey to you, and through you to your fellow citizens of Indianapolis, our sincere appreciation of the cordial and fraternal welcome which you have accorded to us, and to express the hope that the relations between this Association and the people of Indianapolis so happily begun, will always remain as friendly as they are at the present moment. (Applause.)

President Brenton: The Local Committee on Arrangements wishes to make an announcement, and I will ask you to give your attention to Dr. Roberts, Chairman.

Dr. George H. Roberts: Mr. President, the Local Committee on Arrangements wishes to announce that tickets for the banquet to be held on Thursday evening will be on sale at the door, as you pass out. If you are unable to get tickets this morning, they will be on sale up to Thursday, at the registration booth down in the front hall.

President Brenton: The next order of business is the roll call.

Dr. Lyman: Mr. President, I move that we dispense with the roll call and substitute in its place the registration at the door. Seconded. (Carried.)

President Brenton: The next business is the submission of the minutes of the previous meeting.

Dr. G. R. White: Mr. President, I move that the minutes of the previous meeting as printed in last year's report be accepted. Seconded. (Carried.)

President Brenton: The next business on the program is the President's address. (See Reports of Officers and Committees, President's Address.)

Secretary Marshall: Mr. President and fellow members: I have a telegram here from Professor Liautard, which I know you will all be glad to hear:

"Paris, France.

"Recalling the friendly meetings of years gone, I send friendliest greetings and wishes for a successful convention.

"(Signed) Liautard."

Dr. Lyman: Mr. President, I would like to offer a motion that the President be instructed to appoint a committee of three members to draw up an acceptable answer in reply to the telegram received from Dr. Liautard. Seconded. (Carried.)

President Brenton: I will appoint Dr. Winchester, Dr. Dalrymple, and Dr. Dougherty as a Committee to reply to the cablegram from Dr. Liautard.

Secretary Marshall: I also have a telegram from ex-President Melvin:

"Washington, D. C.

"Best wishes for a most successful meeting in every respect. Regret that I cannot be with you all in person as I am in thought."

"(Signed) A. D. Melvin."

Dr. S. Stewart: Mr. President, I move that the President answer the very solicitous telegram which we have received from Dr. Melvin. Seconded. (Carried.)

President Brenton: If there is nothing more to come before the house, this morning, a motion to adjourn will be received.

On motion, duly made, seconded and carried, it was voted to adjourn until 2 o'clock.

Tuesday Afternoon,
August 27, 1912.

SECTION ON SURGERY.

The section on Surgery convened in Room B of the German House, Indianapolis, Indiana, at 2 o'clock, under the leadership of Second Vice-President Dr. L. Van Es, who acted as Chairman.

Vice-President Van Es: Gentlemen, the session on surgery will now come to order; and we may as well start immediately with the program. I will call on George H. Berns, of Brooklyn, New York, for his paper

entitled "The Handling of Radial Paralysis and Its Treatment by Mechanical Fixation of Knee and Ankle." (See Papers and Discussions.)

VICE-PRESIDENT VAN ES: I will now call upon the next speaker, Robert C. Moore, of Kansas City, Missouri, who will read a paper on "Natural and Acquired Qualifications of a Surgeon." (See Papers and Discussions.)

VICE-PRESIDENT VAN ES: There being no discussion upon the paper by Dr. Moore, we will proceed with the next item on the program.

Dr. W. L. Williams, of Ithaca, New York, then gave an illustrated lecture on "Sterility in Cattle." (See Papers and Discussions.)

VICE-PRESIDENT VAN ES: I will now entertain a motion to adjourn.

On motion, seconded and carried, the section stood adjourned until the following day, at 9 o'clock a. m., to then reconvene for the purpose of conducting clinics at the Indiana Veterinary College.

TUESDAY AFTERNOON,
August 27, 1912.

SECTION ON MEDICINE.

The section on Veterinary Medicine was called to order at two p. m., in the German House, Indianapolis, Indiana; Vice-President V. A. Moore in the chair.

VICE-PRESIDENT MOORE: Gentlemen, you will note from the program that this session is to be given over to the reading and discussion of papers. In order to get through, we will have to abide by our By-Laws and in case a paper is not completed within twenty minutes, of course, a motion will enable the reader to continue.

The first paper is entitled "The Standing of the Veterinary Practitioner in the South," by E. M. Ranck of Agricultural College, Mississippi. (See Papers and Discussions.)

VICE-PRESIDENT MOORE: If there is no discussion, the next is a paper on "Remarks on Ophthalmia, with Special Reference to Certain Traumatic and Idiopathic Disturbances," by R. P. Lyman, of East Lansing, Michigan. (See Papers and Discussions.)

VICE-PRESIDENT MOORE: Proceeding with our program, the next paper is entitled "Knuckling Behind as a Symptom of Spavin," by James McDonough of Montclair, New Jersey. (See Papers and Discussions.)

VICE-PRESIDENT MOORE: The next paper on the program is on "Stifle Lameness," by David W. Cochran, of New York City. (See Papers and Discussions.)

VICE-PRESIDENT MOORE: The discussion of Dr. Cochran's paper being closed, I now have the pleasure of introducing N. S. Ferry, M.D., of Detroit, Michigan, who will read his paper entitled "Bacillus Bronchisepticus: Its Relation to Canine Distemper." (See Papers and Discussions.)

VICE-PRESIDENT MOORE: If there is no objection we will declare the session closed for this day.

TUESDAY AFTERNOON,
August 27, 1912.

SECTION ON SANITARY SCIENCE AND POLICE.

The session was called to order at 2 o'clock p. m., in Room C, the German House, Third Vice-President Jensen presiding.

VICE-PRESIDENT JENSEN: I desire to say, gentlemen, that the papers are limited to twenty minutes and the discussion to ten minutes unless otherwise provided by motion.

The first paper will be read by Frederic S. Jones, Ithaca, New York, subject: "Bacillary White Diarrhea in Chickens." (See Papers and Discussions.)

VICE-PRESIDENT JENSEN: The next item on the program is a paper entitled: "Use of Fermentation Test in Practical Dairy Inspection," by Louis A. Klein and H. C. Campbell, Philadelphia, Pennsylvania. (See Papers and Discussions.)

VICE-PRESIDENT JENSEN: I will next call upon Charles H. Higgins, Ottawa, Canada, to present his paper on "Anthrax Vaccines." (See Papers and Discussions.)

VICE-PRESIDENT JENSEN: If you will give your attention to Dr. R. A. Archibald, Oakland, California, he will present his paper "The Laboratory and Its Relation to Medical Science." (See Papers and Discussions.)

There being no discussion we will pass on to the next item on the program "Some Important Factors in the Control of Communicable Diseases," by Veranus A. Moore, Ithaca, New York. (See Papers and Discussions.)

VICE-PRESIDENT JENSEN: The next paper is by C. A. Cary, Auburn, Alabama, entitled: "Standard Pure and Potent Biologic Products." (See Papers and Discussions.)

At the close of the discussion upon Dr. Cary's paper, it being 5:30 p. m., the session adjourned.

TUESDAY EVENING,
August 27, 1912.

GENERAL SESSION.

The second general session of the Association was called to order at 8:30 p. m., in the auditorium of the German House, President S. Brenton in the chair.

PRESIDENT BRENTON: If you will please come to order, gentlemen: The first thing on the program, this evening, is to welcome visitors and delegates.

Delegates from veterinary organizations were announced as follows:

Colorado Veterinary Medical Association:
I. E. Newsom, Fort Collins; George H. Glover, Fort Collins; Charles G. Lamb, Denver.

Keystone Veterinary Medical Association:
Warren L. Rhoads, Lansdowne; Thomas Kelly, Philadelphia; Edgar W. Powell, Bryn Mawr.

Maine Veterinary Medical Association:
Harry W. Lynch, Portland.

Montana Veterinary Medical Association:
M. E. Knowles, Helena; W. J. Taylor, Bozeman.

New Hampshire Veterinary Medical Association:
H. M. Lewis, Nashua; W. B. Loring, Milford; L. Pope, Portsmouth; G. E. Chesley, Rochester; G. Derrah, Manchester.

New York State Veterinary Medical Association:
David W. Cochran, New York; George H. Berns, Brooklyn; W. G. Hollingworth, Utica.

North Dakota Veterinary Medical Association:
L. Van Es, Fargo; J. W. Robinson, Garrison; W. S. Stinson, Grafton.

Pennsylvania State Veterinary Medical Association:
John Reichel, Glenolden; W. Horace Hoskins, Philadelphia; W. E. Wight, Pittsburgh; F. H. Schneider, Philadelphia; George Magee, Uniontown.

South Dakota Veterinary Medical Association:
E. A. McCain, Gregory; J. L. Barber. Tyndall.

Texas Veterinary Medical Association:
John E. Wilkins, Greenville; R. P. Marstellar, College Station; E. R. Forbes, Fort Worth.

Western Pennsylvania Veterinary Medical Association:
C. W. Springer, Uniontown; Edward A. Cahill, Canonsburg.

During the roll of state and provincial veterinary associations representatives also responded from Alabama, Alberta, California, Illinois, Indiana, Kansas, Louisiana, Manitoba, Massachusetts, Michigan, Mississippi, Missouri, New Jersey, Ohio, Ontario, Tennessee, and Washington.

Delegates Daniel Le May and Walter Fraser were announced as sent by the war department to represent the veterinary service of the United States army.

President Brenton: As the Executive Committee is not prepared to make a report this evening, I will call for the reports of the officers. The first is that of the Secretary.

Secretary C. J. Marshall, Philadelphia, Pennsylvania, then submitted his annual report. (See Reports of Officers and Committees, Secretary's Report.)

Dr. W. Horace Hoskins: I move, Mr. President, that the report be received, and such parts as are necessary be referred to the Finance and Executive Committees, respectively.

Dr. A. T. Kinsley: Second the motion. (Carried.)

PRESIDENT BRENTON: The next is the Treasurer's Report.

DR. GEORGE R. WHITE: Mr. President, and gentlemen of the Association: The Treasurer's Report has been printed and distributed; it is self-explanatory and shows exactly how much money has been received and for what purposes expended. The total receipts for the year have been $8,102.02, and the total disbursements, $4,894.93, leaving a balance in the bank at this time of $3,207.09.

I would say, further, that we have managed to take care of three special appropriations this year, and that all bills before being paid were first approved by the Secretary and President. (See Reports of Officers and Committees, Report of Treasurer.)

DR. W. HORACE HOSKINS: I move the report be received and referred to the Finance Committee. Seconded. (Carried.)

PRESIDENT BRENTON: The next is the report of the Librarian, Dr. W. L. Williams, of Ithaca, New York. (See Reports of Officers and Committees, Report of the Librarian.)

DR. A. T. KINSLEY: Move the report be received and that we tender the retiring librarian a vote of thanks for faithful services performed during the past ten or more years. Seconded. (Carried.)

PRESIDENT BRENTON: I take much pleasure in tendering to you, Dr. Williams, a vote of thanks from the Association.

The next on the program is a report from the Committee on Diseases, Dr. John R. Mohler, Chairman.

Dr. Mohler then presented the regular report of the Committee on Diseases, announcing that in addition to a presentation by the Chairman regarding a few of the more important infectious diseases found in this country, there were supplementary contributions by individual members of the Committee. (See Reports of Officers and Committees, Committee on Diseases.)

DR. LYMAN: Mr. President, I move that the report be received and that the resolutions contained therein be referred to the Executive Committee.

DR. A. T. KINSLEY: I second the motion.

DR. W. HORACE HOSKINS: Mr. President, I would like to offer an amendment, that the discussion of the report remain open, to be considered when papers are considered in another section incident to the Committee on Diseases. Amendment seconded. (Amendment and motion carried.)

DR. S. STEWART: Mr. President, the Nominating Committee is ready to make a report, if you wish to have it presented at this time.

Dr. Stewart then presented the following report:

The Nominating Committee, consisting of ten, duly organized and authorized me to submit to this Association the names of the following gentlemen as candidates for the several elective offices: For President, C. A. Cary, Alabama; C. G. Lamb, Colorado; Richard P. Lyman, Michigan; John R. Mohler, District of Columbia; and Edward H. Shepard, Ohio. For Vice-President: Francis Abele, Massachusetts; John W. Adams, Pennsylvania; P. H. Browning, California; Louis P. Cook, Ohio; Charles E. Cotton, Minnesota; E. A. A. Grange, Ontario; Moses Jacob,

Tennessee; Hans Jensen, Missouri; George B. McKillip, Illinois; Veranus A. Moore, New York; Isaac A. Newsom, Colorado; George H. Roberts, Indiana; Charles H. Stange, Iowa; Fred Torrance, Manitoba; and Louis Van Es, North Dakota. For Secretary: D. Arthur Hughes, Illinois; Albert T. Kinsley, Missouri; Clarence J. Marshall, Pennsylvania; Sofus B. Nelson, Washington; and Edward M. Ranck, Mississippi. For Treasurer: Robert W. Ellis, New York; John R. Mitchell, Indiana; and George R. White, Tennessee. For Librarian: Samuel H. Burnett, New York.

A motion by Dr. W. Horace Hoskins was duly seconded and carried; and the general session stood adjourned until the following day at 2 o'clock p. m.

WEDNESDAY MORNING,
August 28, 1912.

SECTION ON SURGERY.

The section on Surgery met in the Indiana Veterinary College, at 9:00 o'clock, where clinics were conducted. Dr. J. W. Klotz acted as director of the clinic, which was presided over by Vice-President George H. Roberts, of Indianapolis, Indiana. (See the Clinic.)

WEDNESDAY MORNING,
August 28, 1912.

SECTION ON SANITARY SCIENCE AND POLICE.

Symposium on Hog Cholera.

The session was called to order at 10 o'clock a. m., Dr. H. Jensen, Third Vice-President in the chair.

VICE-PRESIDENT JENSEN: Gentlemen, if you will come to order, we will take up the subject of hog cholera, and I will call upon Dr. R. A. Craig, of Lafayette, Indiana, to open the symposium with his paper entitled "The Efficiency of Anti-Hog Cholera Serum as a Curative and Preventive Agent." (See Papers and Discussions.)

VICE-PRESIDENT JENSEN: It is our purpose to postpone discussion until after all the papers have been read. I trust those of you who are interested—and I assume you are all interested—will get out your pencils and note books and make notes upon what you intend to discuss later.

The following papers were then read prior to opening a discussion upon the various phases of hog cholera considered by several contributors to the symposiums:

"Hog Cholera in Manitoba," by C. D. McGilvray, Winnipeg, Canada. (See papers and Discussions.)

"The Hog Cholera Serum Work with Special Reference to Disappointments," by M. H. Reynolds, University Farm, St. Paul, Minnesota. (See Papers and Discussions.)

"Nature of the Virus of Hog Cholera," by R. R. Dinwiddie, Fayetteville, Arkansas. (See Papers and Discussions.)

"Studies on Hog Cholera," by R. H. Wilson, Detroit, Michigan. (See Papers and Discussions.)

At one o'clock the session adjourned.

WEDNESDAY AFTERNOON,
August 28, 1912.

GENERAL SESSION.

A general session of the Association was called to order in the German House, at 2 p. m., President S. Brenton in the chair.

DR. WINCHESTER: Mr. President, as we understand that the Executive Committee are prepared to take up the matter of making plans for the Fiftieth Anniversary, I request that you receive from the Committee on Fiftieth Anniversary the tentative report which we have ready and which may be then duly referred to the Executive Committee. (See Reports of Officers and Committees, Committee on Fiftieth Anniversary.) The report was duly referred to the Executive Committee.

PRESIDENT BRENTON: I will now call upon Dr. George H. Glover, Chairman of the Committee on Intelligence and Education, to read the report of that Committee.

Dr. Glover then presented the Chairman's portion of the report of the Committee on Intelligence and Education, announcing special contributions from individual members as follows:

"The Preparation of the Student for Official Veterinary Examination" by E. A. A. Grange, Toronto, Canada.

"Clinical Instruction" by A. T. Kinsley, Kansas City, Missouri.

"Neglected Features in Most Courses as Now Offered" by K. W. Stouder, Manhattan, Kansas.

The other members of the Committee followed Chairman Glover, each reading his contribution to the report. (For these, see Papers and Discussions.)

DR. GLOVER: Mr. President, I want to call attention to the reports of the Resident Secretaries. I have twenty-two of them and want to suggest that they might be made of far greater importance and given more prominence in our meetings than has been the case in the past. Some of them are excellent. If these reports are to be made in connection with the report of the Committee on Intelligence and Education, I think more of a feature should be made of them. (See Reports of Officers and Committees, Reports of Resident Secretaries.)

PRESIDENT BRENTON: Gentlemen, you have heard the report of the Committee on Intelligence and Education. What is your pleasure?

DR. WINCHESTER: I move it be received and referred to the Executive Committee. Seconded. (Carried.)

PRESIDENT BRENTON: The next on the program is the consideration of the report from the Committee on Veterinary Colleges, Dr. Tait Butler, Chairman. (See Reports of Officers and Committees.)

On motion by Dr. Mayo, seconded by Dr. Lyman and subsequently debated upon by Drs. Hughes, Butler, White, Mayo, Hoskins, Ackerman and Gill, it was regularly voted to receive the report and accept the recommendations of the Committee. (For discussion, see the report.)

DR. G. W. WHITE: Mr. President. I move that this Committee be continued for at least one more year, and that a special appropriation be set aside, to an amount not exceeding five hundred ($500.00) dollars, for

the payment of their necessary expenses. In justice to this Committee, I would like to say that an appropriation of five hundred dollars was made last year and that they expended less than three hundred of that amount. I consider it one of the best expenditures ever made by this Association. Seconded. (Carried.)

DR. MAYO: Mr. President, those of us who have been interested in veterinary hygiene and instruction in agricultural colleges for many years are convinced that there is already too great a difference in the course given to agricultural students in the different schools of this country; therefore, I offer the following motion: "That a Committee of this Association, to consist of three members, be appointed to recommend a course in veterinary science for agricultural students in the state agricultural colleges."

Motion amended by Dr. Hoskins, that the recommendation go to the Executive Committee and be brought back for consideration. Amendment seconded. (Motion carried as amended.)

PROPOSED AMENDMENT.

DR. S. STEWART: Mr. President, I want to present a motion at this time. Article VIII, Section 2, Paragraph B. of our By-Laws, defining the college matriculation requirements in order to render graduates eligible for membership specifies that the course shall consist of a period of not less than twenty-four months, beginning with the session 1913-14. I move:

> "That this requirement be suspended for two years and that in its stead the course of instruction shall consist of twenty-one months during this period."

The twenty-four months provision was adopted last year, and I believe, we did not have a thorough understanding of what it meant to each of the veterinary colleges of this country. It was adopted with the very highest motives, I believe, but since then the problem has been more thoroughly studied in the several veterinary colleges particularly affected by this provision, and in their judgment it will be very inimical to have it go into force in 1913-14. This six months' advance just now will be an exceedingly serious thing to them and I do not believe for a moment that this body wants to seriously cripple the private colleges of this country.

In the modified By-Laws adopted last year, there is no definite amount of instruction required. They fail to state that there shall be any particular amount of instruction given by veterinary instructors, but simply that there must be five veterinary instructors on the faculty. The provisions in these particulars are very lax indeed, and until this Association can fix a definite standard of proficiency required of students before graduation, until it shall designate what subjects must be taught by veterinarians, and the amount of time to be given to various subjects, we ought not to be in a hurry to put into effect the increased time requirement.

It does not seem to me that this Association should insist at once upon this increase in the period of time. The old regulations only required three years, of at least six months each, but many of the colleges

are now giving three years of seven months, and they are now trying to comply with the terms of Circular 150, bureau of animal industry, which prescribes many conditions making for more efficient instruction not included in the Association's matriculation requirements, and in the effort to meet these required conditions the private colleges are having great difficulty. They need a little more time, as well as a little help to get up to the standard which is now demanded by the United States civil service regulations. I know that they are trying to do so and are as much in earnest as any one in this room, or as any veterinarian in this country, and I can say to you truly that they will take another step forward just as soon as they can. I believe it will come within one year, but they would like to have you give a little elasticity to this rule, and suspend the portion of paragraph B. referred to, for a period of two years. Seconded.

President Brenton: I suppose that, according to our By-Laws, this proposition will have to go to the Executive Committee and be presented anew by them.

PROPOSED AMENDMENT.

Dr. E. B. Ackerman: Mr. President, I have an amendment to offer: I move that the whole of Section XII, of Article 7, of the By-Laws, be stricken out, and the following language be substituted therefor, so when amended it will read:

"All nominations for office in this Association shall be made from the floor."

Dr. Lyman: I move that the proposed amendments take the usual course. Seconded. (Carried.)

President Brenton: They go to the Executive Committee. I believe the Executive Committee are ready to submit a report, and I will call upon Dr. Shepard, Chairman, to present the report from that Committee. (See Reports of Officers and Committees, Executive Committee, first meeting.)

President Brenton: You have heard this report from the Executive Committee. What will you do with it?

Dr. Lyman: Mr. President, I move that we consider each item seriatim. Seconded. (Carried.)

On motion, duly sconded and passed, it was voted to approve the recommendation that Dr. W. H. Roberts be reinstated.

It was regularly voted to approve the recommendation to the Association that Dr. J. G. Hernsheim be reinstated to active membership whenever the necessary fees which should have accompanied his application shall have been paid to the Secretary.

Dr. Shepard Reads: It was voted to recommend to the Association that the By-Laws be suspended and that the names of all applicants for membership received on or before the 26th day of August and approved by the Executive Committee be admitted to membership. Moved to approve. Seconded. (Carried.)

In accordance with the above vote, applicants received within thirty

days prior to August 26th, 1912, and recommended by the Executive Committee were approved for membership.

It was regularly voted to approve the recommendation to the Association, that Dr. M. V. Gallivan, graduate of Queens University, Ontario, be admitted to active membership. (See Newly Elected Members.)

It was duly voted to approve the recommendation to the Association that William Creighton Woodward, M. D., Health Officer of the District of Columbia, late Secretary of the American Public Health Association; also, Dr. Mazyck P. Ravenel, a member of the Commission for the Study and Control of Bovine Tuberculosis, be elected to honorary membership in this body.

The recommendation to the Association to accept the resignations of Drs. G. H. Caldwell, E. J. Snyder, Edgar Odell and G. E. Nesom, was duly approved.

The recommendation to the Association, to elect to active membership those applications regularly received and appended to the report of the first meeting of the Committee, was duly approved, with the exception of three names which, on motion by Dr. Reynolds, were referred back to the Committee for reconsideration and for the purpose of establishing eligibility of graduates of the Detroit Medical College, veterinary department.

Dr. Lyman: Mr. President, I move that the By-Laws be suspended and that aside from those names to which exception has been taken, the list of candidates reported favorably by the Executive Committee and approved for election to our active membership be duly elected by instructing the Secretary to cast the ballot of the Association for their election. Seconded. (Carried.) (See Newly Elected Members.)

Secretary Marshall: Mr. President, I now cast the ballot of the Association for election to active membership those gentlemen whose names you have just heard read, with the exception of the ones referred back.

President Brenton: I declare them duly elected.

Dr. A. H. Baker: Mr. President, that being disposed of, I move that the newly elected members be given badges signifying full membership in this Association. Seconded. (Carried.)

Dr. Lyman: Mr. President, I move that the By-Laws be suspended and that the Secretary be instructed to cast the ballot of the Association for the election to honorary membership those gentlemen whose names were recommended in the report just read. Seconded. (Carried.)

Secretary Marshall: Mr. President. complying with your instructions, I cast the ballot of the Association for the election to honorary membership of W. C. Woodward, M. D., Washington, D. C., and Mazyek P. Ravenel, Madison, Wisconsin.

It was then duly voted that the report be adopted as a whole.

Dr. Shepard: Mr. President, I have here a report of the second meeting of the Executive Committee, which is ready to be submitted.

Dr. Shepard then read the report of the Executive Committee's second meeting. (See Reports of Officers and Committees, Executive Committee, second meeting.)

It was regularly moved, seconded and carried to receive the report and consider each item separately.

It was moved and seconded to adopt the recommendation from the Committee, that the Terra Haute Veterinary College be placed upon the accredited list of colleges. (Carried.)

On motion, duly seconded and passed, it was voted to concur with the Executive Committee, by rejecting the application of the United States College of Veterinary Surgeons, to be placed upon the accredited list of colleges.

DR. A. T. KINSLEY: I move that the By-Laws be suspended and that the Secretary be instructed to cast the ballot of the Association for election to active membership those applicants whose names were read in the second report from the Executive Committee. Seconded. (Carried.)

SECRETARY MARSHALL: By direction of the Association, I cast the ballot of the Association for the election to active membership those applicants whose names were referred to in the motion just passed. President Brenton then declared them elected. (See Newly Elected Members.)

It was voted to adopt the recommendation approving the application for reinstatement of J. W. Scott, and the report of the committee was adopted as a whole.

Dr. Shepard then read the report of the third meeting of the Executive Committee. (See Reports of Officers and Committees, Executive Committee, third meeting.)

It was moved, by Dr. Ackerman, and duly seconded, that applicants for active membership favorably endorsed in the report of the third meeting of the Executive Committee, be elected under suspension of the rules, instrûcting the Secretary to cast the ballot of the Association. (Carried.) (See Newly Elected Members.)

SECRETARY MARSHALL: By direction of the Association, I now cast the ballot of the Association for the election to active membership those applicants whose names have just been read.

The remaining recommendation from the Executive Committee was regularly referred back to that body.

DR. SHEPARD: I have still another report from the Executive Committee.

Dr. Shepard then read the report of the fourth meeting of the Executive Committee. (See Reports of Officers and Committees, Executive Committee, fourth meeting.)

On motion by Dr. A. T. Kinsley, duly seconded and passed, it was voted to adopt the following resolutions approved by the Executive Committee: "Resolved, that the incoming President be authorized to appoint a committee of five members to draft plans for the reorganization of the Association under laws similar to the International Veterinary Congress, the American Medical Association, or otherwise as in the judgment of the committee it shall be deemed wise; and that the committee make a full report of its doings at the next annual meeting of this Association."

On motion by Dr. G. R. White, it was voted to postpone action on the proposition now before the Association to amend section 3 of Article III of the Constitution and By-Laws, which provided for the abolishment of

the Committee on Diseases, until after the report of the Committee on Reorganization at the next annual meeting.

DR. LYMAN: Mr. President, I move that the report of the Executive Committee be adopted as a whole. Seconded. (Carried.)

DR. W. HORACE HOSKINS: Mr. President, I move the suspension of the rules, and ask for unanimous consent to the consideration of the application of Dr. J. G. Fernehaugh as a member of this Association. Motion seconded.

This motion was debated upon by Drs. Hoskins, Lyman, G. R. White and Newsom and Jensen. Then followed a motion to refer the application back to the Executive Committee. Seconded. (Carried.)

DR. M. H. REYNOLDS: Mr. President, I have a matter to bring before this body. I wish to offer the name of Dr. Marion Dorsett for honorary membership in this Association. We all know the magnificent nature of the work that this individual has done for the live stock interests of this country,—particularly, in planning and directing those efforts which have been so satisfactory toward controlling hog cholera.

It was moved that the name be referred to the Executive Committee. Seconded. (Carried.)

On motion, the session adjourned.

WEDNESDAY EVENING,
August 28, 1912.

GENERAL SESSION.

The members of the American Veterinary Medical Association reassembled in the German House, at 8 o'clock p. m., for the purpose of conducting general business and election of officers; President S. Brenton in the chair.

PRESIDENT BRENTON: Gentlemen, we will proceed in the order of business. I will call upon Dr. W. Horace Hoskins, Chairman, for the report of the Committee on Legislation.

Dr. W. Horace Hoskins then presented the report. (See Reports of Officers and Committees, Committee on Legislation.)

PRESIDENT BRENTON: You have heard the report of the Committee on Legislation. What is your pleasure?

DR. LYMAN: Mr. President, I think the Association owes much to this Committee for the great work that has been done during the past year, and in moving to accept the report and referring it to the Committee on Publication, I would like to add that we extend to the Committee the vote of thanks of the Association.

Motion was duly seconded and carried, unanimously.

PRESIDENT BRENTON: I take much pleasure, Dr. Hoskins, in tendering that word of thanks to you and your Committee. (Applause.)

DR. G. R. WHITE: Mr. President, I would like the members to know that your Committee on Legislation did not spend all the fund appropriated to their use last year; the work that they accomplished has cost considerably less than five hundred dollars. As the bill is still pending in congress and will come up again after the recess, it is absolutely essen-

tial that this or some other committee on legislation be continued. On that account, I move that an appropriation be set aside, not to exceed the sum of five hundred dollars, to defray the expenses for next year.

Dr. A. T. Kinsley: I second the motion. (Carried.)

President Brenton: I will now call upon Dr. Lyman, Chairman, to give the report of the Committee on Publication.

Dr. Lyman thereupon submitted the report. (See Reports of Officers and Committees, Committee on Publication.)

Dr. H. Jensen, Third Vice-President, assumes the chair.

Dr. Mayo: Mr. President, I move the report of the Committee on Publication be referred to the Executive Committee and take its usual course. Seconded. (Carried.)

Vice-President Jensen: Gentlemen, it is now time for the election of officers. Last night the Nominating Committee reported the list of nominations. They are before you, and if you wish to make any further nominations, you will please do so at this time. One President is to be elected, five Vice-Presidents, one Secretary, one Treasurer and one Librarian. (See Nominating Committee Report, page 36.)

Dr. L. A. Klein: Mr. President, I desire to make a motion that the printed list be discarded and that the names of the candidates be written upon the blackboard and posted in front of the rostrum, as in previous years. Motion duly seconded by Dr. Joseph Hughes, and after being debated upon by Drs. Mayo, Jensen, Klein and H. C. Moore, was put to the vote and carried.

Dr. T. E. Smith: Mr. President, I desire to place a nomination in the name of H. D. Gill, of New York City, for President. Nomination seconded by Dr. R. C. MacKellar.

Vice-President Jensen: I will appoint Drs. Dalrymple, Reynolds, Babb and Juckniess, as tellers to collect and count ballots for President.

Following the second ballot, Dr. E. H. Shepard moved that the election of Dr. J. R. Mohler as President be made unanimous.

Motion seconded by Dr. Gill and carried by a rising vote.

Vice-President Jensen then appointed Drs. Rutherford, Dalrymple, Reynolds, James Robinson, Martin, and Ryan, as tellers for the Vice-Presidential election.

Drs. Mayo, Ackerman, Archibald and Burson were duly placed in nomination for Vice-President, and the nominations duly seconded.

Vice-President Jensen: The following, in the order named, are the five highest on your ballots, and I declare them duly elected Vice-Presidents: First, George H. Roberts, Indiana; Second, John W. Adams, Pennsylvania; Third, Hans Jensen, Missouri; Fourth, Charles E. Cotton, Minnesota; Fifth, Veranus A. Moore, New York.

Dr. J. C. Blattenberg: I desire to place in nomination for Secretary the name of Dr. L. A. Merillat, of Chicago. Nomination seconded.

The Chair appointed Drs. Van Es, Seeley and Bostrum to act as tellers to collect and count the ballots for Secretary.

On the second ballot, the Chair announced the election of Dr. Marshall, to succeed himself as Secretary.

Following the vote for Treasurer, the Chair announced the re-election

of Dr. George R. White. The Chair then called for the ballots for the office of Librarian.

DR. N. S. MAYO: Mr. President, as there seems to be but one nomination for this office, I move that the Secretary be instructed to cast the unanimous ballot of this Association for the election of Dr. Samuel H. Burnett, of New York, and the By-Laws be suspended that the Secretary may do so.

Pursuant to the motion, which was duly seconded and carried, Secretary Marshall announced that he cast the unanimous ballot of the Association in favor of Dr. Samuel H. Burnett, as Librarian for the ensuing year.

On motion by Dr. E. B. Ackerman, duly seconded and carried, the Chair appointed Drs. Ackerman and Ranck to escort the newly elected President to the platform.

DR. JOHN R. MOHLER: Mr. Chairman and members of this Association and friends: It is rather unusual at this time for the newly elected President to make a speech. I certainly appreciate to the fullest extent the great honor you have conferred upon me this evening in electing me to the high office of President of this Association for the ensuing year and I feel doubly honored tonight on account of the fact that the next President of this body will be called upon to preside over the Golden Anniversary of the American Veterinary Medical Association. There are only a few organizations in this country of the size of this Association, that have existed long enough to enjoy an anniversary such as we expect to celebrate next year, and in accepting this evidence of your esteem I do so with full appreciation of the responsibilities which will necessarily be associated with the presidential office on this memorable occasion.

I wish to thank you most heartily for the confidence which you have reposed in me and to assure you that I shall have the welfare of this Association at heart during the ensuing year in advancing its interests along every line. I again thank you. (Applause.)

The meeting then adjourned.

THURSDAY MORNING,
August 29, 1912.

SECTION ON SURGERY.

Without any formality, the third session of the Section on Surgery was called to order at the Indiana Veterinary College, at 9 o'clock a, m., for the purpose of continuing the clinic.

Dr. W. L. Williams opened this session by reading a paper having reference to the operation of roaring, which he was about to demonstrate. (See "The Clinic.")

THURSDAY MORNING,
August 29, 1912.

SECTION ON MEDICINE.

Symposium on Glanders.

A joint session of the sections on medicine and on sanitary science and police was called to order at 10 o'clock a. m., Dr. V. A. Moore, First Vice-President, presiding.

Vice-President Moore stated that all the papers would be read before there would be any discussion.

The following papers were read:

"Quarantine and Disinfection in Connection with Outbreaks of Glanders," by George W. Pope, Washington, D. C. (See Papers and Discussions.)

"Clinical Symptoms and Pathologic Anatomy of Glanders," by W. Reid Blair, New York City. (See Papers and Discussions.)

"Glanders Vaccine," by R. S. MacKellar, New York City. (See Papers and Discussions.)

"The Sero-Diagnosis of Glanders," by K. F. Meyer, Philadelphia, Pennsylvania. (See Papers and Discussions.)

"The Mallein Test," by C. J. Marshall, Philadelphia, Pennsylvania. (See Papers and Discussions.)

"The Prevalence of Glanders; the Common Modes of Dissemination; Control and Eradication," by J. G. Wills, Chateaugay, New York. (See Papers and Discussions.)

At six o'clock p. m. the session was adjourned.

THURSDAY AFTERNOON,
August 29, 1912.

GENERAL SESSION.

The session was called to order at 2:20 p. m., in the German House, Indianapolis, Indiana, President Brenton in the chair.

PRESIDENT BRENTON: Gentlemen, if you will come to order, I will call upon W. H. Dalrymple, Chairman, to read the report of the Committee on Necrology. (See Reports of Officers and Committees, Committee on Necrology.)

PRESIDENT BRENTON: Gentlemen, you have heard the report of the Committee on Necrology. What is your pleasure?

DR. N. S. MAYO: I move the adoption of the report. Seconded. (Carried.)

PRESIDENT BRENTON: I will call for the report of the Committee on Finance. (See Reports of Officers and Committees.)

DR. N. S. MAYO: I move, Mr. President, that the report be accepted and referred for publication. Seconded. (Carried.)

PRESIDENT BRENTON: We will now listen to another report from the Executive Committee.

Dr. Shepard then read a report of a meeting of the Executive Com-

mittee. (See Reports of Officers and Committees, Executive Committee, fifth meeting.)

The several recommendations presented in the report of the fifth meeting of the Executive Committee were considered seriatim and adopted. After this, the report was regularly adopted as a whole; and, pursuant to a motion made by Dr. A. T. Kinsley, which was duly seconded and carried, Secretary Marshall announced the ballot of the Association for the election to active and honorary membership those candidates whose names were included in the report. (See Newly Elected Members.)

Dr. Shepard: I have another report from the Executive Committee. (See Reports of Officers and Committees, Executive Committee, Sixth Meeting.)

In this report from the Executive Committee were included resolutions previously referred to them by the Association and which were included within the report from the Committee on Fiftieth Anniversary. These resolutions were:

1st. Abolition of Clinic for that occasion.

2nd. The tentative selection of McAlpine Hotel as headquarters, and giving power to the Executive Committee and Secretary to complete such arrangements.

3rd. Appropriation of $1,500 from the Association funds.

4th. Appointment of Dr. Alexander Liautard, Paris, France, as Honorary President.

5th. A resolution referring to presiding officers for each session.

6th. Limitation to four or five major subjects for the program.

These resolutions were considered seriatim and adopted without debate, except the third, having reference to an appropriation of fifteen hundred dollars. Drs. Reynolds, Winchester, G. R. White, Lyman and Mayo took part in this debate. Dr. Winchester explained the purposes of the appropriation, whereup the third resolution was regularly adopted.

Dr. Winchester said: "Mr. President and Gentlemen: Explaining the purposes of this recommendation, we anticipate that the Association will be honored by the presence of individuals not necessarily members of the veterinary profession, but men of international and national reputation. We expect that a number of such men will be present at our Golden Anniversary and that the expenses of these individuals will be borne by the Committee, from the time they start from their homes until they go back again. It will be necessary to have a number of them because each day will be practically a new meeting, and every morning the President of this Association will have the honor and privilege of introducing some gentleman who will entertain you according to his ideas. We will not necessarily limit these invitations to one man each day, for in some instances we may have two. Further, we want to have at the banquet the best representation of the veterinary profession that can be obtained in this country, perhaps abroad, and naturally, there will be different people that will address you invited to the banquet. Of course, if there is any of this money that is not used, it can be turned back to the Association, but this money is appropriated as a special fund out of which to pay these expenses, having nothing to do with local entertain-

ment whatever, but only to cover the expenses which our Association will have to assume if we are going to have men eminent in the profession. The Committee does not feel as though it ought to be handicapped, as you might say, by not having money enough to meet expenses of these individuals, and for that reason we hope that this recommendation of the Executive Committee will be accepted.

Dr. Shepard then reread the following recommendation from the Executive Committee:

AMENDMENT.

"On motion, duly seconded and passed, it was voted to recommend to the Association that paragraph B, section 2, Article VIII, of the By-Laws, defining the college matriculation requirements in order to render graduates eligible to membership in this Association, and specifying that the course of instruction shall consist of twenty-four months beginning with the session of 1913-14, be suspended for a period of one year, and that a course of instruction consisting of twenty-one months be substituted for the said period of two years."

Dr. A. T. Kinsley moved that the recommendation be adopted. Seconded.

DR. GLOVER: Mr. President, I wonder if all who have heard that resolution really understand what it means. In my opinion it is vastly more important than the question as to who shall preside over the different sessions of our Golden Anniversary, more important, indeed, than anything that has come up before the Association during this meeting. This matter was threshed out at the Toronto meeting, and we voted to make a step which should mark some progress in matriculation requirements, and in the length of the college courses. Now, at this, the next meeting of our Association we are about to take a step backward. I am opposed to the resolution, Mr. Chairman. The question is, shall we continue to progress or step backward? I appreciate the fact that the application of this rule may work rather a hardship on some of our schools, where a loss of twenty-five per cent in the enrollment is a very serious financial consideration, but at the same time, the other schools are also suffering from a dirth of students due to the fact that in some instances the requirements have been allowed to remain too low.

I think this is a serious matter, and while I am not going to oppose this recommendation at this time, feeling that we should give plenty of time to the schools to re-adjust themselves, or to adjust their conditions to this new situation, without working an injury upon them, I want it understood that we at least trust that when the time comes there will not be any further resolution to put off this reform another year. Veterinary education must go on. It must advance with the world. The idea that whereas it takes four years on top of an education received at some of our high schools to properly train civil engineers, but for the practice of veterinary medicine we will be satisfied with a course of study, only three years in length, and in some instances without the benefit of the high school

training, must not maintain. We have come to the point where we must have at least three years on top of the education which the common schools give. This Association should take a positive and definite stand in favor of higher standards of veterinary education. This thing has come rather suddenly upon some of the schools, and they seem today to think it is going to work a hardship upon them. I hope that this matter will never come up again, or any such resolution as this, because if it does, I shall oppose it with all the strength I have. The principle is as broad as the laws of the Universe that we must either progress, or be run over by the wheels of evolution.

Dr. S. Stewart: Mr. President and Gentlemen: It does me a great deal of good to hear Dr. Glover continue to express his views with reference to higher veterinary education. He is right in most particulars and I am glad to hear him say that he will not oppose this recommendation submitted by that Committee. He makes one point that I fear may mislead some. He says that last year we took a step forward, and as I understand him, that this recommendation means a step backward. In my judgment we took two steps forward and this resolution adjusts it to one step forward. Experience of the past year has shown that the colleges cannot adjust themselves to this new condition quite as quickly as it was hoped that they would, and this resolution is simply delaying this second step forward a little time. Every one, so far as I know, is heartily in sympathy with this resolution, and I trust that you will support it at this time.

Dr. Grange: Mr. President, I feel particularly sorry that this matter has come up at this time, especially so, as I was told last year that veterinary colleges in the future would have to adopt a course of four years, or at least a course of three years with nine months' sessions, and as far as the Ontario Veterinary College is concerned, the necessary steps have been taken to meet the requirements which were expressed in the minutes of this Association last year. We have talked the matter over with the trustees who control the college with which I am connected, and it may be necessary for me to say that they approved of the step which had been taken. When I talked the matter over with them I explained why I thought it was a good move, and they agreed with me. I can only hope the resolution of last year will be carried forward. I regarded it then as a step forward, and have not changed my opinion.

Dr. Rutherford: Mr. President, I really think we are making a mountain out of a mole hill in this matter. This is simply giving to the colleges which are not yet quite ready to take this step forward time in which to make a little further preparation. There is nothing whatever in the proposition now before the Association which can possibly be interpreted to mean that any school doing it is not taking a forward step. It is simply giving the privilege to the schools which are not yet quite ready a little more time in which to prepare to take that step, and it is simply delaying for a year longer. I think Dr. Glover took the right view. We well know how strongly he feels on the subject and there is no question of the strength of the feeling of the members of this Association in favor of taking a more advanced position as to veterinary edu-

cation. After all, it is only a year's delay, and under the circumstances, to my mind, is eminently a fair proposition.

At the close of this debate the question was put by a rising vote and the Chair announced the resolution adopted as read.

It was regularly voted to adopt the report as a whole.

DR. LYMAN: Mr. President, I move that the By-Laws be suspended and that the Secretary be instructed to cast the ballot of the Association for the election to active membership those gentlemen whose names were read in the report just submitted. Seconded. (Carried.) (See Newly Elected Members.)

SECRETARY MARSHALL: In accordance with the direction of the Association, I cast the ballot in favor of the election of those applicants whose names have been read.

DR. G. R. WHITE: Mr. President, as a result of the action on the report of the Special Committee on College Investigation, yesterday, there seems to be a wrong impression in regard to the Grand Rapids Veterinary College. There is an impression that the school is removed from the list of our accredited colleges. In order to do justice to the Grand Rapids Veterinary school and clear away this cloud, I move that it is the sense of this Association that the Grand Rapids Veterinary College be retained on the list of schools accredited by this Association. Seconded. (Carried.)

DR. MAYO: Mr. President, the Executive Committee has approved a resolution which they have not yet presented but are prepared to present tomorrow. I move that we take this resolution up out of its usual order and receive it at this time, as I desire to say just a few words on it before I go. It deals with a resolution to appoint a committee of five members of this Association to pass upon advertisements submitted to them of proprietary preparations offered to the agricultural interests of the country.

DR. RANCK: I second the motion. (Carried.)

The stenographer then read the resolution as found in the Minutes of the Executive Committee meeting, as follows:

> "On motion duly seconded and passed, it was voted to recommend to the Association, that a committee of three members be appointed to assist papers representing the live stock and agricultural interests of the country to purge their advertising columns of fake and misleading advertisements concerning proprietary preparations put out for the use of veterinarians and the public."

DR. MAYO: In order to explain this resolution, Mr. President, I will state that you are probably familiar with the fact that as regards human medicine many of the leading periodicals of the country are not only refusing advertisements of fake and quack preparations but they are at the same time attacking these preparations. Now, in the realm of animal medicines that are put before the market, there are a number of leading agricultural journals of the United States, like the American Farmer and Stockman, that are anxious to clear their columns of such advertisements. Some of the papers of this country have already taken up this subject, and I am glad to say that one of them, at least, which has a close relationship with one of the members of this body, has actually

swept all advertisements of that kind from its columns at a serious monetary loss. "The North-Western Agriculturalist," "The Farm Journal," "The Country Gentleman," and also "The Successful Farmer," want to clear up their advertising columns from this kind of advertisement, and I believe it would be a splendid thing for this Association to go before the American farmers and stock breeders with such a committee as the recommendation suggests, thus offering our assistance in relieving them from this burden that is imposed upon them. It would likewise be a good thing for our members as well as for the agricultural papers of this country. There is nothing compulsory about it, understand; simply, if any agricultural paper cares to submit its advertising list to this committee, their assistance will be offered, backed by the support of this Association in an effort to remove these frauds that are perpetrated upon the American farmer and stockman.

Dr. Rutherford: Mr. President, there is no doubt a very great deal of truth in what Dr. Mayo says, but I recommend a certain amount of caution in this regard for the reason that there may be advertisements which the committee could not in their judgment condemn that will go forth as having the endorsement of the American Veterinary Medical Association. As an old practitioner I know a great deal of mischief has been done to the live stock in this country and Canada by the use of reasonably efficacious proprietary preparations, due in part at least to the unintelligent use of these medicines by those who are not skilled in professional matters. Preparations which in the hands of professional men would really be found to be efficacious for the purposes for which they are put out. While we may condemn some of the worst of these, we would be placing ourselves in a position, professionally, which we might not wish to occupy, and it seems to me that before the Association takes any definite action upon the matter that a note of warning should be sounded.

Dr. N. S. Mayo: Mr. Chairman, I should say perhaps in explanation that you will understand that this does not say "veterinary preparations." What this resolution proposed to do is to authorize this committee only to pass upon such advertisements as may be submitted to them. I want to do nothing that is going to hurt the profession, and I would not stand here for a minute to advocate a thing which would operate in that direction. This matter has got to be handled, of course, diplomatically, and I believe that the incoming President, with the committee appointed to deal with it, made up of some of our best and wisest men, should give the support of the veterinary profession to this movement. That is what I think our great agricultural papers want,—more support from the veterinary profession in order to help them clear up their advertising columns of these unreliable preparations.

Dr. A. H. Baker: It seems to me, Mr. President, that the thought naturally arises, if an advertisement or a preparation is submitted to this proposed committee for examination and the committee finds that there is no occasion to condemn it, that that lack of condemnation by the committee amounts to an endorsement by it or by this Association. I do not think this committee of this Association could afford to endorse any-

thing of that kind, and it seems to me that that question is going to arise very naturally in connection with whatever work is brought before such a committee.

The resolution was regularly adopted as read.

PRESIDENT BRENTON: The next item on the program is the report of the International Commission on the Control of Bovine Tuberculosis; John J. Rutherford, Chairman. (See Reports of Officers and Committees, Tuberculosis Commission Report.)

DR. G. R. WHITE: Mr. President, I move that the report be received, and the Commission retained. Seconded. (Carried.)

PRESIDENT BRENTON: The next thing on the program is the report of the Special Committee on Anatomical Nomenclature. Dr. S. L. Stewart presented the report on behalf of the Committee. (See Reports of Officers and Committees.)

This report was debated upon to some considerable extent by Drs. S. L. Stewart, Connaway, G. R. White, Rutherford, V. A. Moore, Reynolds, W. H. Hoskins and C. J. Marshall. The principal topic under discussion was that for having an appropriation made for the continuance of the work so ably begun by the Committee. On motion by Dr. A. H. Baker, duly seconded, it was voted to receive the report and continue the Committee. (Carried.)

Dr. W. H. Hoskins moved that a sum not exceeding three hundred dollars be set aside by the Treasurer of the Association for the expenses of this Committee. Seconded. (Carried.)

It was moved and seconded that the President and Secretary of this Association issue a sworn statement to the effect that the Southwestern Veterinary College, of Dallas, Texas, is not on the list of colleges accredited by this Association. (Carried.)

DR. LYMAN: Mr. President, I want to offer an amendment which has already been signed by several members, to amend Article III, section 2, of the Constitution, to read as follows:

PROPOSED AMENDMENT.

"The President, the five Vice-Presidents, the Secretary and the Treasurer, together with six members to be elected by the Association, shall constitute the Executive Committee. The outgoing President shall be designated as the Chairman of said Committee."

Also, to amend Article VI., of the By-Laws, to read:

PROPOSED AMENDMENT.

"Section 1. Six members from the Association shall be elected by ballot to serve as members of the Executive Committee; two of them shall serve for one year, two for two years, and two for three years, from the date of their election; and thereafter the Association shall annually elect two members of the Executive Committee to serve for the term of three years from and after the date of their election."

Also, to amend:

Article VI., Sections 1, 2, 3, 4, 5 and 6, by changing their numerical order to Sections 2, 3, 4, 5, 6 and 7, respectively.

(Signed)

S. STEWART.
R. P. LYMAN.
E. M. RANCK.

DR. HOSKINS: I move, Mr. President, that the proposed amendments take the usual course, being referred to the Executive Committee. Seconded. (Carried.)

On motion, duly seconded and passed, the convention adjourned.

FRIDAY MORNING,
August 30, 1912.

SECTION ON SURGERY.

The clinic was resumed on Friday morning, at 9 o'clock, at the Indiana Veterinary College. (See "The Clinic.")

FRIDAY MORNING,
August 30, 1912.

SECTION ON MEDICINE.

Session was called to order at 10 a. m. In absence of Vice-President Jensen, Dr. Charles H. Higgins, director of the section, presided.

CHAIRMAN HIGGINS: Gentlemen, if you will come to order we will carry out our business with as much expedition as possible. With your permission, we will change the order of the program a little, in order to get the papers properly classified. I will call on Dr. C. C. Lipp of St. Paul, Minnesota, to read his paper entitled "Animal Metabolism Under Conditions of Poor Ventilation." (See Papers and Discussions.)

THE CHAIRMAN: You have heard the paper by Dr. Lipp. If there is no discussion, we will pass on to the next: "Results with the Compliment Fixation Test in the Diagnosis of Contagious Abortion in Cattle," by F. B. Hadley and B. A. Beach, of Madison, Wisconsin. (See Papers and Discussions.)

THE CHAIRMAN: I will now call on Dr. Ward Giltner for his paper on "Infectious Abortion in Cattle." (See Papers and Discussions.)

THE CHAIRMAN: The next is a paper by S. H. Burnett, Ithaca, New York, on "Sclerostomatosis of the Arteries in the Horse." (See Papers and Discussions.)

THE CHAIRMAN: I will call on Dr. E. A. Watson of Lithbridge, Alberta, to read his paper entitled, "Further Investigations with Dourine." (See Papers and Discussions.)

THE CHAIRMAN: That completes the deliberations of this section, and if there is nothing further we will now adjourn.

FRIDAY MORNING,
August 30, 1912.

SECTION ON SANITARY SCIENCE AND POLICE.

The session was called to order at ten o'clock, First Vice-President, V. A. Moore, presiding.

VICE-PRESIDENT V. A. MOORE: Gentlemen, the first thing on the program this morning is a paper entitled, "Autotherapy," by Charles H. Duncan, M.D., New York City. (See Papers and Discussions.)

VICE-PRESIDENT MOORE: I will call upon Dr. Pierre A. Fish, Ithaca, New York, to present his contribution, entitled "Bob Veal and the Conservation of the Meat Supply." (See Papers and Discussions.)

VICE-PRESIDENT MOORE: The next paper on the program is entitled "Educating the Public on Control and Eradication of Tuberculosis," by John F. DeVine, Goshen, New York. (See Papers and Discussions.)

In the absence of Daniel J. Healy, M.D., Lexington, Kentucky, it was regularly moved, seconded and carried that his paper entitled "The Normal Clinical Urinalysis of the Dairy Cow," be read by title and referred to the Committee on Publication.

At one o'clock the session adjourned.

FRIDAY AFTERNOON,
August 30, 1912.

GENERAL SESSION.

The meeting of the Association was called to order at the German House, Indianapolis, Indiana, at 2 p. m., Dr. S. Brenton in the chair.

PRESIDENT BRENTON: The first business this afternoon, is the report of the Executive Committee. (See Reports of Officers and Committees, Executive Committee, seventh meeting.)

DR. LYMAN: Mr. President, I move that the report be received and that action on the recommendations from the Committee be taken up seriatim. Seconded. (Carried.)

On motion of Dr. G. E. Leech, duly seconded and passed, it was voted to adopt the recommendation to the Association that the incoming President appoint a committee to investigate modern diagnostic methods for the detection of glanders and reaching an understanding as to the best methods for the reduction of the disease.

The remaining recommendations were read and approved and the report adopted as a whole.

DR. LYMAN: I move, Mr. President, that the By-Laws be suspended and that the Secretary be instructed to cast the ballot of the Association for the election of the applicant to active membership. Seconded. (Carried.)

SECRETARY MARSHALL: In accordance with the directions of the Association, I now cast the ballot of the Association for election of Dr. Nixon to active membership. (See Newly Elected Members.)

DR. G. R. WHITE: As it seems to me, Mr. President, that it will be necessary to fix the number of members to investigate diagnostic methods

for the detection of glanders, I move that a committee consisting of five be authorized. Seconded. (Carried.)

DR. W. H. HOSKINS: Mr. President, in view of the fact that in 1914 there is to be held in England a Tuberculosis Congress, a thing which was referred to both in the address of the President and later by Dr. Rutherford, it seems to me that we should take some action in regard to that matter. I understand also that sometime in October there will be a meeting at Lyons, France, for the purpose of considering plans upon which this Congress should conduct its work. There has already been some suggestion as to whether it might be possible for us to meet with them in 1914, or, if not meeting with them we might have a very large representation there. As it is quite probable that Dr. Rutherford, who is a member of the congress, will attend the meeting in Lyons, France, I wish that the incoming officers be directed to certify that Dr. Rutherford has been delegated to represent this Association at the Lyons meeting. As the congress will be conducted in England, and as Dr. Rutherford will be there, I have no doubt that he could provide for our representation as well as any one in this country; therefore I make the motion at this time. Seconded. (Carried.)

DR. W. HORACE HOSKINS: Mr. President, I would like to offer, under a suspension of the rules, consideration of the application of Dr. J. G. Ferneyhaugh, of Virginia. Motion seconded.

DR. A. T. KINSLEY: Mr. President, I move as an amendment to Dr. Hoskins' motion, that the application of Dr. F. G. Cook, of Texas, be considered under the same suspension of the rules. Amendment seconded.

DR W. HORACE HOSKINS: Dr. Ferneyhaugh is a graduate of the Polytechnic Institute of Virginia, subsequently graduating from the United States College of Veterinary Surgeons at a time when we were electing graduates of that college to membership in this Association. Since his graduation, we have elected a classmate of his as a member and also seen fit to take away from that school its place upon our accredited list. Dr. Ferneyhaugh is state veterinarian of Virginia and president of the Virginia Veterinary Medical Association. He is highly educated, a trained man, and is doing as much to uplift the profession in Virginia as any man I know. He has been of the greatest service possible in the campaign at Washington for the improvement of the veterinary profession in the army, and I feel that we ought to place upon him the seal of the membership in this Association.

DR. A. T. KINSLEY: Mr. President, Dr. Cook is a worthy member of the profession, secretary of the Texas state board of veterinary examiners, and resides in Paris, that state, where he has established a system of veterinary inspection that is second to none for a city of its size in the United States. This man is in good standing in his own state, and I know by personal visits that all regard him as a leader who has done more, perhaps, to advance the interests of the veterinary profession at large than any other man in Texas.

Following a debate upon these applications for membership, participated in by Drs. Mayo, Hoskins, Moore, Leech, G. R. White, A. H. Baker, T. E.

Smith, A. T. Kinsley, C. J. Marshall, S. Stewart and Cary, the question was put, and, under suspension of the rules, applications considered.

Dr. A. H. Baker: I move, Mr. President, that we again suspend the rules of the Association and elect Dr. Ferneyhaugh and Dr. Cook to active membership by having our Secretary cast a favorable ballot. Seconded. (Carried.)

Secretary Marshall: Mr. President and gentlemen: In accordance with the vote of the Association, I cast the ballot electing to active membership Dr. James G. Ferneyhaugh and Dr. F. G. Cook.

President Brenton then declared them duly elected.

Dr. A. H. Baker then moved that the name of the United States College of Veterinary Surgeons be placed upon the accredited list, as it refers to all graduates prior to the time the college was eliminated from the list of veterinary institutions recognized by this Association. After being duly seconded and debated upon, it was moved by Dr. C. A. Cary to refer this question of acceptance to the Executive Committee for a report next year. Seconded. (Carried.)

President Brenton: We are now ready for the report of the Committee on Resolutions, Dr. S. Stewart, Chairman. (See Reports of Officers and Committees, Committee on Resolutions.)

Dr. A. H. Baker: Mr. President, I move that the report of the Committee on Resolutions be received and the items considered seriatim. Seconded. (Carried.)

Each resolution was read and adopted without debate.

Dr. Stewart: Mr. President, I would like to say that it was intended that a resolution should be prepared and presented with reference to the affiliation of the association of college faculties and state examining boards with this Association, but it has been overlooked. Consequently, I would like to have you accept verbally the substance of that request.

The association of college faculties and state examining boards passed a resolution to request the American Veterinary Medical Association to make the former association a section of this Association—i. e., that it become a part of the work of the Committee on Intelligence and Education. I move the acceptance of the suggestion, and that the matter be referred to the Reorganization Committee of the American Veterinary Medical Association. Motion seconded. (Carried.)

President Brenton: The next on the program is new business. As your Secretary informs me that there is no further business to bring before the Association at this time, I take great pleasure in appointing Dr. V. A. Moore and Dr. W. Horace Hoskins to conduct our newly elected President to the platform.

(Dr. John R. Mohler, President-elect, escorted to the chair.)

President Brenton: Dr. Mohler, in presenting you this gavel, the emblem of authority, I know that you will always use it in the right way and that in your hands it will be wielded wisely and well for the benefit of the Association. I congratulate you on your election. (Applause.)

(Dr. John R. Mohler takes the chair.)

President Mohler: Gentlemen of the Association, in accepting this gavel as the emblem of authority in the American Veterinary Medical

Association, I can only reiterate the statements that I made Wednesday evening after you had honored me with the highest position at the disposal of the veterinary profession in America. I fully realize and recognize the great responsibilities which you have placed upon my shoulders in entrusting me with the care of the Association during the coming celebration of our Golden Anniversary. I shall use my greatest endeavor to conduct the duties of this office for the greatest good, and with the earnest assistance of the other officers and of each and every member of this Association, I trust that when the year is up none will have cause to regret my tenure of office. It is with a great deal of pleasure that I accept this position, and my foremost desire will be to fulfill the obligations of the office with the same inpartiality and the same justice as has marked the administration of my predecessor and friend Dr. Brenton. I again thank you for the honor you have conferred upon me.

The next on the program was the installation of the other elective officers.

President Mohler: Is there any further business to be brought before the Forty-ninth Annual meeting of the Association?

Dr. T. E. Smith: Mr. President, before this meeting adjourns, I think it is in order that we express a rising vote of thanks to the retiring officers of this Association for their earnest and able efforts during the past year. Seconded. (Carried unanimously.)

Dr. Lyman: Mr. President, I move that the convention adjourn. Seconded. (Carried.)

President Mohler: It is voted that the Forty-ninth Annual meeting of the American Veterinary Medical Association is adjourned.

S. Brenton

PRESIDENT

Reports of Officers and Committees.

PRESIDENT'S ADDRESS.

SAMUEL BRENTON,
Detroit, Michigan.

Fellow Members of the American Veterinary Medical Association, Visitors, and the Ladies:

In again acknowledging my appreciation of the great honor done me a year ago at Toronto when you elected me to the highest office in the gift of the profession in America, I do so with the full sense of the responsibility which goes with that honor. I wish to emphasize what was said a year ago that the appreciation is all the greater on account of the honor coming upon the anniversary of my majority, at the threshold of my Alma Mater, in the land of my birth, and largely through the assistance of my associates resident in the land of my adoption.

Ever since the Toronto meeting I have been trying to figure out why such an honor should have been bestowed upon a humble member in the ranks, as it were, and long ago I came to the conclusion that it was not from any personal worth or any accomplishment of my own, but rather as a compliment to the Michigan State Association, as well as a tribute to the practicing veterinarians, from whose ranks a presiding officer had not been chosen for a number of years.

I have thought, too, that it might be for the purpose of getting rid of me by putting me on the shelf, as it were, as many of the ex-presidents have dropped out of service as soon as their term of office had expired. I want to give you a fair warning, however, right now that something else will have to be done to prevent me from meeting my associates at each anniversary, returning the hearty hand-clasp, and hearing the kindly expressions which make life so much worth the living. At each anniversary some familiar face will be missed, for the Grim Reaper will exact his toll, and although the ranks will be filled by others,

there are those who have so endeared themselves to us that their memories should ever be kept green by some permanent memorial. The Committee on Necrology will take proper notice of those who have departed this life during the past year.

This Association is nearing its fiftieth milestone. How best to commemorate that event has been the study of several of the members from the east, and it seems but proper the anniversary should be celebrated at the birthplace of the United States Veterinary Medical Association, now the American Veterinary Medical Association. The question now is, how can we make the meeting most memorable? One way is by increasing the membership, which should be doubled in the next year, and it could easily be done if each one would constitute himself a committee of one, sending in to the Secretary at least one new name, or as many more as possible of his worthy associates. In that way we would be able to celebrate our golden anniversary with a membership of not less than two thousand and five hundred. Let us all do our part and even the Effete East will have to hustle to entertain the hordes that will be with us in 1913. The 1913 committee in their report will tell you how to do the rest.

The Forty-Ninth Anniversary of this Association has opened so auspiciously that I am led to believe that a wise selection as to location was made by the Executive Committee when choosing Indianapolis for the meeting of 1912, it being near the center of population and easy of access from every quarter. With what is perhaps the greatest number ever assembled on the opening day, and with a real Hoosier welcome which had been promised us by the Local Committee a month ago, further emphasized by the kindly and earnest words of the speaker this morning, I am sure we can already anticipate a very pleasant time and a profitable meeting.

There has been a gradual increase in the number of applications during the past few years and this year is fully up to the average. In looking over the report of the meeting of the United States Veterinary Medical Association for 1891, the Secretary's salary, which prior to then was one hundred dollars per year, was increased to two hundred dollars. The income at that time was from seven hundred and fifty to eight hundred dollars, there being less than three hundred members. Dr. Hoskins, Secretary at that time, spent considerable more than his salary attending different meetings in the interests of the parent Asso-

ciation. He also sent out over five thousand communications of different kinds and nine hundred and fifty notices of the meeting. Then we were satisfied if the secretary's expenses did not exceed four or five hundred dollars so that there would be a balance of two or three hundred dollars in the treasury. It was also in that year that President, Dr. Huidekoper, at the time I have referred to, recommended that applicants for membership should be members of their county or state association, this is now being done, and I believe it is a wise move.

At the present time we have approximately fourteen hundred members, and an income of from six to eight thousand dollars from fees and dues, as a consequence the duties of our Secretary has been considerably increased during the past year as is amply demonstrated by observing the program prepared with its feast of good things for your entertainment and instruction. I am prompted, therefore, to recommend in view of the greater importance of the coming meeting that the Secretary's salary be increased to a sufficient amount to allow him to employ a permanent stenographer or assistant in the work of the office so that the same can be attended to promptly.

I wish now to publicly thank all the officers of this Association for the many courtesies extended, and to express my appreciation of the work done by the members of the various committees with whom my associations have been so pleasant during the past year. The Committee on Legislation, under the direction of that able and energetic Chairman, Dr. Hoskins, has waged such a campaign at Washington in the interests of army legislation that we are still hopeful of the bill giving rank and recognition to the army veterinarian becoming a law in the near future. Dr. Hoskins has found out to his satisfaction the source of the opposition to our bill, which has been manifest for the past twenty years or more, and has succeeded in smoking out the military department who appear to have long been behind the holdup in veterinary army legislation. If ever a committee's work deserved success, the Committee on Legislation does this year, and a recognition in some substantial manner should be given Dr. Hoskins for his untiring and unselfish work on that Committee, both for the time and money expended.

The Committee on Publication deserves great credit for the efficient manner in which the report was completed in record breaking time.

The Special Committee on College Investigation has accomplished a great deal with the small amount of money appropriated, and I am very glad to state that it is ready to report a steady improvement among veterinary colleges.

I do not know whether the Committee on Veterinary Anatomical Nomenclature is ready to report, as the Chairman, Dr. Sisson, is in Europe, but I believe that an appropriation will be necessary to aid the continuance of the work for the coming year.

That serum therapy does now and will in the future play a very important part in the prevention and eradication of disease I am satisfied, and, also, that its use with the aid of sanitary science will within a few years' time be the means of controlling many of the infectious diseases; greater care, however, should be exercised in the manufacture and distribution of these products.

Among some of the later serums or vaccines used, might be mentioned that for the treatment of distemper in dogs, which is a boon to both the owner of our most faithful friend and the veterinarian who may have the treatment in hand. You will probably hear more later regarding the treatment of same from Dr. Ferry, who has succeeded in isolating the germ of that fatal malady, canine distemper.

The Phylacogeni, or modified vaccines, which are being used very extensively by the medical profession in the treatment of various diseases with very satisfactory results, are being introduced into veterinary practice, and I must say that the reports from some of our associates in the treatment of pneumonia, influenza or even in infected wounds have been quite remarkable. I am of the belief that very satisfactory results may be obtained from their employment.

I am very glad to note that, through the work of one of our older members, the profession in England as well as Continental Europe is awakening to the fact that something may be learned even from the American veterinarians. I am speaking now of Professor W. L. Williams' operation for roaring, which he personally introduced into England and which is being practiced so largely by Professor Hobday, whom many of you met in Toronto last year. The operation has been taken up by the profession in Italy as well as the other countries of the old world, and I noticed lately in some report that the Russian government had sent some valuable stallions to Professor Hobday to be operated upon.

That the profession in England has a more friendly feeling toward the profession in this country is evidenced by the reports received from over the water. In this connection I might mention that in a letter received only yesterday from Professor Hobday he expresses the hope that we may have a very successful meeting, that he would like very much to be with us, and wishes me at the same time to call your attention to the International Veterinary Congress in 1914 to be held in London, hoping that a large delegation from this Association may attend that great meeting. I sincerely hope that a goodly number of us may be privileged to go to London at that time.

The meetings of the American Veterinary Medical Association in the various states where they have been held, as a rule, have been productive of much good, and I have every reason to believe that the Indiana veterinary medical association will have no cause to regret the great effort they have made in order to properly entertain this immense gathering; moreover, I sincerely hope that the profession in Indiana will feel that having this meeting of the American Veterinary Medical Association within their borders has benefited the profession in their state.

I know that the profession in Michigan was greatly strengthened by the meeting in 1900, and we will be glad to try to entertain you when you feel that you can again meet in the City of the Straits.

Our Association had a period when an unseemly struggle for official places, both elective and appointive, characterized our annual meeting. The getting of office for themselves or friends engaged time and thoughts of members to such an extent that the usefulness of this Association as a scientific organization became of secondary consideration to many. So obnoxious had the political methods employed become, and so great was the perversion of the time of the meeting in the scramble for office, that our Association ceased to attract new members, to either hold the respect or coöperation of those who had joined for purely professional purposes.

So serious was the disruption of the legitimate work of the Association through political methods of selecting officers that this Association framed into its organic law a provision making its ex-presidents, who are no longer eligible for elective office, a permanent Committee on Nomination, and by resolution expressly forbid nominating speeches.

Many of the newer members have no personal knowledge of the struggles to secure important places by ambitious individuals —to the very great scandal of this scientific body, and do not realize the beneficent influence of the present plan of nomination. It is very apparent to those who have long acquaintance with association affairs that our nominating committee has without prejudice endeavored to serve the very best interests of the Association in its selections, and I commend a very careful study of the excellence of this plan of selecting nominees for office to those who have become members in recent years, before they shall enter into what seems to be a growing discontent with the present method because of the agitation of a few who in their ambition seek to control through political methods, regardless of the baleful influence of such methods. I sincerely hope that the younger membership will take counsel of their elders in this organization, that we may go on with the better and more amicable methods of selecting officers.

Before closing, I wish to pay a compliment to the ladies, who have done so much, not only to increase membership in the Association, but who have made our meetings better in many ways. I am glad to see so many of them present with us today. (Applause.)

REPORT OF THE SECRETARY.

C. J. Marshall,

Philadelphia, Pa.

Membership in the Association is made up as follows. Honorary members, 22; honor roll members, 30; active members, 1,356; making a total of 1,408*. The membership and this year's successful candidates are divided among the states and provinces as follows:

	Members.	Candidates.		Members.	Candidates.
Alabama	9	1	Delaware	3	
Arizona	3		District of Columbia	26	5
Arkansas	3	1	Florida	5	
California	102	3	Georgia	6	
Colorado	30	2	Idaho	5	
Connecticut	28	1	Illinois	96	20

*Twenty-nine (29) members were dropped during the year for non-payment of dues.

	Members.	Candidates.
Indiana	54	55
Iowa	44	9
Kansas	42	8
Kentucky	9	8
Louisiana	16	1
Maine	5	1
Maryland	17	4
Massachusetts	49	2
Michigan	43	17
Minnesota	51	1
Mississippi	9	
Missouri	51	12
Montana	8	1
Nebraska	44	6
Nevada	5	2
New Hampshire	3	1
New Jersey	36	
New Mexico	12	
New York	93	8
North Carolina	10	5
North Dakota	26	17
Ohio	47	34
Oklahoma	2	
Oregon	15	
Pennsylvania	100	17
Philippine Islands	17	5
Porto Rico	2	
Rhode Island	7	
South Carolina	4	
South Dakota	29	2
Tennessee	17	2
Texas	18	4
Utah	10	
Vermont	5	1
Virginia	11	4
Washington	22	4
West Virginia	3	3
Wisconsin	43	8
Wyoming	4	1
OTHER COUNTRIES.		
Alberta	9	4
British Columbia	13	
Manitoba	16	1
Saskatchewan	9	3
New Brunswick	1	
Nova Scotia	2	
Ontario	18	3
Prince Edward Isl'd.	1	
Quebec	9	1
Australia	2	
England	2	
Hawaii	2	
Jamaica	1	
Brazil	1	
Ireland	1	
	1,386	288

Total membership, honorary and active, 1912-1913, 1,696.

The addresses of the following members are not on file with the Secretary:

Charles R. Biles, formerly Elkton, Md.
William E. Day, formerly Seattle, Washington.
Clarence O. Durfee, formerly San Luis Obispo, Cal.
Gerald P. Dillon, formerly New Westminster, B. C., Canada.
Oscar A. Hansen, formerly Claypool, Indiana.
W. A. Heck, formerly West Liberty, Iowa.
Clarence Loveberry, formerly San Francisco, Cal.
Robert A. Phillips, formerly Oklahoma City, Oklahoma.
William R. Richard, formerly Denver, Colo.
B. Harry Sayre, formerly Charleston, Tenn.
Henry P. Smith, formerly Albion, Mich.

If the addresses of any of the above are known the Secretary should be notified.

The following members have been in active membership for twenty-five consecutive years and are therefore eligible for the honor roll: Thomas Bland, Tait Butler, C. Courtney McLean, David E. Salmon and A. Strange.

The following have been regularly proposed for Honorary Membership in our Association: Mazyck P. Ravenel, M. D., Madison, Wis.; William Creighton Woodward, M. D., Washington, D. C., and Marion Dorsett, M. D., Washington, D. C.

The following members have tendered their resignations for consideration this year: S. Houston Caldwell, Chicago, Ill.; Edgar Odell, New York, N. Y.; Eugene J. Snyder, Jr., Sioux Falls, S. D.; G. E. Nesom, Mobile, Alabama.

The Secretary's books show the following financial condition for the year ending August 15, 1912:

Dues outstanding, August 14, 1911:	
Sixty-four members owed nine dollars	$576.00
One hundred and seventy-seven members owed six dollars	1,062.00
Five hundred and seventy-four members owed three dollars	1,722.00
Total outstanding	$3,360.00
Regular annual dues from 1,356 active members, at three dollars each	$4,068.00
Twenty-nine members dropped, who should have paid nine dollars each	261.00
Amount that should have been collected, less above $261.00	$7,167.00
Amount actually collected from Aug. 14, 1911, to Aug. 15, 1912	3,101.20
Dues outstanding, August 15, 1912	$4,065.80

Actual amount of dues outstanding, according to Secretary's books, August 15, 1912:

Ninety-two members owe nine dollars	$828.00
Two hundred members owe six dollars	1,200.00
Six hundred and seventy-four members owe three dollars	2,022.00
One member owes five dollars	5.00
One member owes one dollar	1.00
Total	$4,056.00

Amount outstanding according to record computed since 1911	$4,065.80
Amount outstanding according to Secretary's books, 1912	4,056.00
Discrepancy	$9.80

This discrepancy is due to the fact that the amount of dues outstanding in 1911 was $3,354.00 instead of $3,360.00 as was reported, and when the error was discovered it was too late to make the correction. I can vouch for the accuracy of the statement of dues outstanding August 15, 1912. A slight variation in the account is also due to the exchange charged by the bank on out-of-town checks and foreign money.

The total receipts during the year were as follows:

Balance on hand, August 14, 1911, as shown in Annual Report	$141.19
Amount received for dues at Toronto meeting	471.00
Amount received for applications at Toronto meeting	304.00
Amount received from Committee on Legislation (balance)	21.53
Amount received from bank for interest, shown in bank book	6.15
Amount received for dues since August 25, 1911	2,630.20
Amount received for applications since 1911	1,944.00
Total receipts	$5,518.07

DISBURSEMENTS.

January 9, 1912, Check to George R. White, Treasurer	$1,725.00
July 11, 1912, Check to George R. White, Treasurer	400.00
August 20, 1912, Check to George R. White, Treasurer	3,391.87
Total disbursements	$5,516.87

Vouchers turned over to Treasurer for payment to July 11, 1912	$4,894.63
Vouchers turned over to Treasurer for payment to August 20, 1912	6,088.87

The Secretary was instructed at the last annual meeting to arrange a card index system for keeping the financial records of the Association. This work has been done and it is hoped that the Committee on Finance will have less trouble in auditing his accounts than in former years. A list of the members has been arranged alphabetically by states and provinces during the year and will be published and distributed to the members in a short time. A list of the members in each state was mailed to the Resident Secretaries during the year.

Last year an effort was made to run the program in sections, and another attempt has been made this year. Considerable at-

tention has been given to the subject so that some of the objectionable features of last year may not be repeated. If the time is ripe for introducing section work—and your Secretary feels that it is—the sections should be organized and definite arrangements made for conducting them. The details of their organization should be carefully considered.

A different plan for conducting and transacting the routine business of the Association might be desirable. Would it not be well to have the state or provincial associations send delegates to this Association and give them authority to represent the views of their constituents in this Association? The delegates could make up what might be known as the "House of Delegates" and this body could transact all the routine business of the Association.

The Secretary recommends that a Committee be appointed to investigate and draft plans to be presented at the Fiftieth Anniversary Meeting for reorganizing the Association along lines, which are already in use by the American Medical Association, the International Veterinary Congress and other well organized societies. It is further recommended that the plan adopted this year for section work shall be continued until such time as the sections may be organized permanently.

Drs. Gill, Higgins, Williams, Klotz, and the Local Committee on Arrangements have worked unceasingly in obtaining and arranging material for the various sections, and the interesting program presented this year is due to their efforts. I desire to express thanks for their advice and assistance, and to all who have contributed in any way in making this meeting a success.

The work of the Secretary has been done as carefully and punctually as circumstances would permit and he trusts that no injustice has been committed.

REPORT OF THE TREASURER.

RECEIPTS FOR 1911-12.

1911			
September	1,	Balance in bank as per annual report	$2,585 15
1912			
January	13,	Received from C. J. Marshall, Secretary	1,725 00
July	16,	Received from C. J. Marshall, Secretary	400 00
August	23,	Received from C. J. Marshall, Secretary	3,391 87
		Total receipts, 1911-12	$8,102 02

DISBURSEMENTS FOR 1911-12.

1911		
November 15,	To C. J. Marshall, Philadelphia, Pa., for expenses incurred in attending 1910 meeting....	$100 00
November 15,	To C. J. Marshall, Philadelphia, Pa., for expenses incurred in attending 1911 meeting..........	42 45
November 15,	Pasteur Laboratories of America, Chicago, Ill., for contribution to erect monument to late Prof. S. Arloing	100 00
November 15,	To John W. Spence, Philadelphia, Pa., for printing, by C. J. Marshall, Secretary........	44 50
November 15,	To T. E. Robinson, Westerly, R. I., for expenses as Resident Secretary to September 1, 1911	1 50
November 15,	To A. Joly, Waterville, Me., for expenses as Resident Secretary to September 1, 1911......	1 00
November 15,	To Francis Abele, Jr., Quincy, Mass., for expenses as Resident Secretary to September 1, 1911...	3 50
November 15,	To Standard Printing Co., Nashville, Tenn., for printing 750 copies Treasurer's report........	20 00
November 15,	To Thomas Farmer, Grand Blanc, Mich., for expenses as Resident Secretary to September 1, 1911	1 65
November 15,	To R. P. Lyman, East Lansing, Mich., for printing, typewriting, expressage, etc.................	10 60
November 15,	To Paul Juckniess, Lincoln, Neb., for expenses as Resident Secretary to September 1, 1911.....	4 78
November 15,	To D. Tamblyn, Regina, Sask., Can., for expenses as Resident Secretary to September 1, 1911....	3 15
November 15,	To H. Preston Hoskins, Philadelphia, Pa., for expenses as Resident Secretary to September 1, 1911	20 00
November 15,	To W. F. Crewe, Devils Lake, N. D., for expenses as Resident Secretary to September 1, 1911	4 00
November 15,	To American Veterinary Review, New York, N. Y., for reprints, expressage, etc.............	14 85
November 15,	To John T. DeVine, Goshen, N. Y., for expenses as Resident Secretary to Sept. 1, 1911........	17 47
November 15,	To Leopold Hay, Taribault, Minn., for expenses as Resident Secretary to Sept. 1, 1911........	9 15
November 15,	To W. Dean Wright, Portland, Ore., for expenses as Resident Secretary to September 1, 1911..	78
November 15,	To F. H. Mackie, Baltimore, Md., for expenses as Resident Secretary to September 1, 1911....	1 26
November 15,	To J. Payne Lowe, Passaic, N. J., for expenses as Resident Secretary to September 1, 1911..	4 10

1911.			
November	15, To	W. W. Dimock, Ames, Ia., for expenses as Resident Secretary to September 1, 1911......	$7 50
November	15, To	George H. Glover, Fort Collins, Colo., for expressage, postage, telegrams, etc.............	25 60
November	15, To	I. E. Newsom, Fort Collins, Colo., for expenses as Resident Secretary to Sept. 1, 1911..	2 00
November	15, To	M. H. Reynolds, St. Paul, Minn., for expressage, postage, etc., Tuberculosis Commission......	13 44
November	15, To	A. J. Tupa, St. Paul, Minn., for stenographic work, Tuberculosis Commission......	1 90
November	15, To	F. S. Allen, Nashua, N. H., for expenses as Resident Secretary to September 1, 1911......	3 00
November	15, To	F. Torrance, Winnipeg, Man., for expenses (typewriting), Tuberculosis Commission......	6 90
November	15, To	J. B. McKee & Co., Nashville, Tenn., for premium on Treasurer's bond...............	10 00
December	7, To	Charles F. Roberts, New Haven, Conn., for reporting and transcribing annual meeting at Toronto	313 55
December	12, To	W. Horace Hoskins, Philadelphia, Pa., for advance on account of expense Committee on Legislation	100 00
December	12, To	A. W. Goldsmith, Philadelphia, Pa., for 250 special certificate cases......................	68 75
December	12, To	R. P. Lyman, East Lansing, Mich., for expenses as Chairman Publication Committee...........	69 72
December	12, To	J. W. Klotz, Noblesville, Ind., for expenses as Resident Secretary......................	9 26
December	12, To	George R. White, Nashville, Tenn., for expenses as Treasurer to Aug. 1, 1911..........	6 30
December	12, To	F. Torrance, Winnipeg, Man., for expenses as Resident Secretary	5 00
December	12, To	C. J. Marshall, Philadelphia, Pa., for cablegram to Paris, France.......................	8 00
December	12, To	C. J. Marshall, Philadelphia, Pa., for telegrams expressage, etc.............................	14 20
December	12, To	C. J. Marshall, Philadelphia, Pa., for 1,500 postage stamps............................	30 00
December	18, To	J. A. Graham, Chicago, Ill., for dues and fees returned	8 00
December	23, To	Robert Smith Printing Co., Lansing, Mich., for cash advanced to cover postage on Proceedings Toronto meeting..................	450 00
1912			
January	10, To	Hon. J. R. T. Hull, attorney, Washington, D. C., for professional services—Committee on Legislation	200 00

1912.			
February	5,	To News Printing Co., Aberdeen, S. D., for 500 letterheads and 500 envelopes, by S. W. Allen, Resident Secretary	$5 25
February	5,	To The Livingston Enterprise, Livingston, Mont., for 500 letterheads, by A. D. Knowles, Resident Secretary	1 75
February	23,	To Scovel Co., Winnipeg, Man., for stationery, by Dr. F. Torrance	3 85
February	23,	To George W. Dunphy, Rochester, Mich., for expenses to Chicago and return	23 93
February	23,	To A. J. Damman, Ellensburg, Wash., for stationery, by Resident Secretary	10 25
February	23,	To John J. Kehoe, Philadelphia, Pa., for 1,000 2-cent stamps	20 00
February	23,	To Stiffler-Will Printing Co., Fort Collins, Colo., for stationery, by Resident Secretary	5 00
February	23,	To M. H. Reynolds, St. Paul, Minn., for expenses to Chicago and return	33 20
March	12,	To Robert Smith Printing Co., Lansing, Mich., 1,700 copies proceedings Toronto meeting	2,408 82
March	12,	To Robert Smith Printing Co., Lansing, Mich., for 2,500 reports Tuberculosis Commission	70 58
March	12,	To M. H. Reynolds, St. Paul, Minn., for freight, drayage and stamps, Tuberculosis Commission	13 42
March	12,	To A. D Knowles, Livingston, Mont., for expenses as Resident Secretary	2 00
March	12,	To Mrs. R. R. Carmack, Nashville, Tenn., for stenographic services Committee on Legislation, by G. R. White	2 50
March	12,	To The White Co., Reno, Nev., for printing, by W. B. Mack, Resident Secretary	2 75
March	12,	To M. H. Reynolds, St. Paul, Minn., for expense on behalf of Committee on College Investigation	45 56
March	12,	To G. W. Dunphy, Rochester, Mich., expense on behalf of Committee on College Investigation.	32 12
July	30,	To M. H. Reynolds, St. Paul, Minn., for expense as member Committee on College Investigation	65 34
July	30,	To Laramie Republican Co., Laramie, Wyo., for printing, by Dr. O. L. Prien	4 50
July	30,	To The Library Bureau, Philadelphia, Pa., for office supplies, by C. J. Marshall, Secretary	29 44
July	30,	To George W. Dunphy, Rochester, Mich., for expenses as member Committee on College Investigation	71 26
July	30,	To R. P. Lyman, East Lansing, Mich., for services and expenses as Chairman Publication Committee	257 41

1912.			
July	30,	To J. P. Foster, Huron, S. D., for expenses as Resident Secretary, 1910	$5 50
July	30,	To M. H. Reynolds, St. Paul, Minn., for expenses as member International Tuberculosis Commission	5 60
July	30,	To Geo. W. Dunphy, Rochester, Mich., for expenses as member Committee on College Investigation	14 54
July	30,	To J. F. Sanford, Fayetteville, Ark., for expenses as Resident Secretary	2 50

Total expenditures, 1911-12 .... $4,894 93

Total receipts $8,102 02
Total disbursements 4,894 93

Balance in Bank $3,207 09

Respectfully submitted,
GEORGE R. WHITE, Treasurer.

Indianapolis, Indiana, August 26, 1912.

REPORT OF COMMITTEE ON FINANCE.

JAMES J. JOY, *Chairman.*
GEORGE W. DUNPHY, E. H. SHEPARD.

To the American Veterinary Medical Association: Your Committee on Finance, beg leave to report that we have carefully examined the books of the Secretary and the Treasurer and find the same to be absolutely correct as per card index and vouchers, and the reports of these officers.

We find that the Secretary has adopted and put into use the card index system of bookkeeping as recommended by the Committee on Finance, in its report last year, and we consider this system complete in every way.

REPORT OF LIBRARIAN.

W. L. WILLIAMS,
Ithaca, New York.

The Librarian failed to report at the 1911 meeting and the present report accordingly covers two association years. The Librarian has nothing of interest to report beyond the receipt and

distribution of unused proceedings which have come into his hands. Two years ago there had come into the hands of the Librarian and remained, or been distributed, proceedings as follows:

	1897	1904	1905	1906	1907	1908	1909	1910	1911
On hand or received...	7	23	28	100	23	174	172	222	291
Distributed	6	8	9	9	10	13	15	28	20
Missing	.....	.....	1	.....	.....	1	5	.....	.....
On hand...	1	15	18	91	13	160	152	194	271

For the first time in the history of the Association the proceedings were forwarded to the members by mail instead of express. The Librarian has watched the result with much interest and finds less complaint from the members of non-delivery of the proceedings and, moreover, that far more copies are returned undelivered. It appears that some members after changing their address expect the proceedings to follow them without notifying the Secretary of their movements, as a result many copies are returned to the Librarian by the postal authorities and the members to whom they are addressed considers this Association negligent in not delivering the proceedings while, as a matter of fact, no one is to blame but the very individual who complains because his report is not delivered.

REPORT OF THE EXECUTIVE COMMITTEE.

E. H. Shepard, *Chairman,*

L. A. Merillat,
S. B. Nelson,
E. B. Ackerman,
V. A. Moore,
H. Jensen,
G. H. Roberts,
C. D. McGilvray,
C. G. Lamb,
S. Brenton,
L. Van Es,
J. P. Turner,
C. J. Marshall
G. R. White.

FIRST MEETING.

The first regular session of the Executive Committee was held in the Moorish Room, Claypool Hotel, Indianapolis, Indiana, Monday, August 26th, at 4 p. m., Dr. E. H. Shepard presiding.

The following members were present: Doctors E. H. Shepard, C. J. Marshall, S. B. Nelson, G. R. White, H. Jensen, C. D. McGilvray, S. Brenton, V. A. Moore, G. H. Roberts and E. B. Ackerman.

Members absent: Doctors Merillat, Van Es, Turner and Lamb.

Members appointed to fill vacancies: Doctors A. H. Baker and Glover.

On motion, duly seconded and passed, it was voted to recommend to the Association that Dr. Wm. H. Roberts, graduate of New York State Veterinary College, 1889, be re-instated.

On motion, duly seconded and passed, it was voted to recommend to the Association that Dr. J. G. Hernsheim of Wisconsin, be re-instated as a member whenever the necessary fees which should accompany his application shall have been paid to the Secretary.

On motion, duly seconded and passed, it was voted to recommend to the Association that the By-Laws be suspended and that the names of all applicants for membership received within thirty days prior to 26th of August, and approved by the Executive Committee, be admitted to membership. (See "Members Newly Elected" which follows report of Executive Committee.)

On motion, duly seconded and passed, it was voted to recommend to the Association that Dr. M. V. Gallivan, a graduate of the Veterinary Department, Queens University, 1898, Kingston, Ontario, be admitted to membership. Vouchers: J. C. Hargrave and E. A. Watson.

On motion, duly seconded and passed, it was voted to recommend to the Association that William Creighton Woodward, M. D., Health Officer of the District of Columbia, and late secretary of the American Public Health Association; also Dr. Mazyck P. Ravenel, a member of the Commission for the Study of Methods for the Control of Bovine Tuberculosis, be elected to honorary membership.

On motion, duly seconded and passed, it was voted to recommend to the Association that the resignations of Drs. S. H. Caldwell, Eugene J. Snyder, Jr., Edgar Odell and G. E. Nesom, be accepted.

On motion, duly seconded and passed, it was voted to recommend that the following applicants be elected to membership in

the Association: (See "Members Newly Elected," which follows report of Executive Committee.)

There being no further business, the Committee adjourned.

Attest: C. J. MARSHALL, *Secretary.*

SECOND MEETING.

The adjourned meeting of the Executive Committee reconvened at the German House, Indianapolis, Indiana, on Tuesday afternoon, August 27th, at 5:30 p. m., Dr. E. H. Shepard, presiding.

Members present: Drs. S. Brenton, V. A. Moore, Van Es, Jenson, G. A. Roberts, C. J. Marshall, G. R. White, E. H. Shepard, Merillat, S. B. Nelson, C. D. McGilvray and Ackerman.

Members absent: Drs. Turner and Lamb.

Member appointed to fill vacancy: Dr. Glover.

On motion, duly seconded and passed, it was voted to recommend to the Association that the Terre Haute Veterinary College, of Terre Haute, Indiana, be placed on the accredited list of veterinary colleges.

On motion, duly seconded and passed, it was voted to recommend to the Association that the application of the United States College of Veterinary Surgeons, of Washington, District of Columbia, to be placed on the list of accredited colleges, be rejected.

On motion, duly seconded and passed, it was voted to recommend to the Association that the By-Laws be suspended and the following applicants be elected to membership: (See "Members Newly Elected," which follows report of Executive Committee.)

On motion, duly seconded and passed, it was voted to recommend to the Association the granting of the application for reinstatement of Dr. John W. Scott, M.D.C., (Chicago Veterinary College, 1893), of Waverly, Minnésota. Vouchers: S. H. Ward and H. C. Lyon.

There being no further business, the Committee adjourned.

Attest: C. J. MARSHALL, *Secretary.*

THIRD MEETING.

The adjourned meeting of the Executive Committee was held at the German House, Indianapolis, Indiana, on Tuesday eve-

ning, August 27th, at 7:30 p. m., Dr. E. H. Shepard in the chair.

Members present: Drs. Shepard, G. R. White, S. Brenton, Van Es, S. B. Nelson, Ackerman, C. J. Marshall, Merillat, C. D. McGilvray and V. A. Moore.

Members absent: Drs. C. G. Lamb and Turner.

Appointed to fill vacancy: Dr. Glover.

On motion, duly seconded and passed, it was voted that Dr. Frank L. Moyer, V.S., Carey, Ohio, Ohio State Veterinary College, 1908, vouched for by Dr. S. E. Anderson and Dr. E. H. Shepard, be recommended for membership in the Association; also that Dr. LeRoy E. Slater, Worthington, Indiana, Terre Haute Veterinary College, 1912, vouched for by Dr. S. V. Ramsey and Dr. C. I. Fleming, be recommended to the Association for election to membership.

On motion, duly seconded and passed, it was voted that Edward F. Westerheide, D.V.M., Minster, Ohio, Grand Rapids Veterinary College, 1910, and vouched for by J. D. Fair, President Brenton and Secretary Marshall, be recommended for membership in the Association.

There being no further business, the Committee adjourned.

Attest: C. J. MARSHALL, *Secretary.*

FOURTH MEETING.

An adjourned meeting of the Executive Committee was held in the parlors of the Claypool Hotel, Indianapolis, Indiana, Wednesday morning, August 28th, at 8:30 a. m., Dr. E. H. Shepard presiding.

Members present: Drs. Shepard, S. B. Nelson, G. A. White, Van Es, Jensen, C. J. Marshall, V. A. Moore and Merillat.

Members absent: Drs. Roberts, Brenton, Turner, Ackerman, McGilvray and Lamb.

Appointed to fill vacancy: Dr. Glover.

On motion, duly seconded and passed, it was voted to recommend to the Association the adoption of the following resolution:

"*Resolved:* That the incoming President be authorized to appoint a committee of five members to draft plans for a reorganization of the Association along lines similar to the International Veterinary Congress, The American Medical Association, or otherwise as in the judgment of the Committee shall be

deemed wise, and that the Committee make a full report of its doings at the next annual meeting of the Association."

On motion, duly seconded and passed, it was voted that we recommend to the Association that action on the proposition to amend Section 3 of Article 7, of the Constitution and By-Laws, providing for the abolishment of the Committee on Diseases, be postponed until after the receipt of the report of the Committee on Reorganization at the next annual meeting of the Association.

There being no further business, the Committee adjourned.

Attest: C. J. Marshall, *Secretary.*

FIFTH MEETING.

A meeting of the Executive Committee was held at the German House, Indianapolis, Indiana, on Wednesday evening, August 28, 1912, at 7:30 p. m., Dr. E. H. Shepard presiding.

Members present: Drs. Shepard, White, McGilvray, Jensen, Van Es, Marshall, Moore, Nelson, Roberts, Brenton and Merillat.

Members absent: Drs. Lamb and Turner.

Member to fill vacancy: Dr. Glover.

On motion, duly seconded and passed, it was voted to recommend to the Association that Dr. John P. DiVine, D.V.M., Ballston, Va., (George Washington University, Veterinary Department, 1911), vouchers: Geo. C. Faville and R. R. Clark, be elected to membership.

On motion, duly seconded and passed, it was voted to recommend to the Association that the election of Dr. J. C. Hunt, V.S., London, Ontario, (Ontario Veterinary College, 1908), be reconsidered and that his application be referred back to the Executive Committee to be retained upon the table of the Executive Committee until the next annual meeting of the Association.

On motion, duly seconded and passed, it was voted to recommend to the Association that the Detroit College of Medicine, veterinary department, be placed upon the list of accredited colleges, graduates of which are eligible to membership in this Association.

On motion, duly seconded and passed, it was voted to recommend to the Association that the applications for membership of Dr. Jas. F. Barnes, D.V.S., Toledo, O., (Detroit College of Medicine, Veterinary Dept.), vouchers, the President and Secretary; also Dr. John E. Ward, D.V.S., Perry, Mich., (Detroit

College of Medicine, Veterinary Dept.), vouchers, H. L. Schuh and Robertson Muir; also, Dr. Martin E. Elzinger, D.V.S., Grand Rapids, Mich., (Detroit College of Medicine, Veterinary Dept.), 1897), vouchers H. L. Schuh and Robertson Muir, be granted and that the same be elected to membership.

On motion, duly seconded and passed, it was voted to recommend to the Association that the By-Laws be suspended and that Dr. Marion Dorsett, M. D., be elected to honorary membership in the Association.

On motion, duly seconded and passed, it was voted to recommend to the Association that the application of Dr. C. E. Salisbury, of Kansas City, for membership in the Association, be granted upon the receipt by the Secretary of a formal application from him and payment of the necessary fee.

On motion, duly seconded and passed, it was voted to recommend to the Association that the By-Laws be suspended and that the following applicants be admitted to membership: (See "Members Newly Elected" which follows report of Executive Committee.)

Upon motion, duly seconded and passed, it was voted to recommend to the Association that the application of Dr. Ernest L. Layne, V. S., Huntington, W. Va., for reinstatement as endorsed by Drs. J. W. Klotz, and O. L. Boor, be granted.

Upon motion, duly seconded and passed, it was voted to recommend to the Association that the application of Dr. Wm. H. Robinson, Portland, Maine, for reinstatement as endorsed by Drs. D. B. Fitzpatrick and F. H. McCarthy, be granted.

On motion the Committee adjourned until 8 a. m. Thursday.

Attest: C. J. MARSHALL, *Secretary.*

SIXTH MEETING.

The Executive Committee reconvened in the parlors of the Claypool Hotel, Indianapolis, Indiana, on Thursday morning, August 29, 1912, at 8 a. m., Dr. E. H. Shepard presiding.

Members present: Drs. Shepard, C. J. Marshall, Ackerman, S. B. Nelson, Van Es, V. A. Moore, G. H. Roberts, Jensen, Merillat and S. Brenton.

Members absent: Drs. Lamb, White and Turner.

On motion, duly seconded and passed, it was voted to recommend to the Association that the application for membership of Dr. J. C. McDaniel, D. V. M., Elwood, Ind. (Indiana Veterinary

College), as vouched for by J. W. Klotz, and O. L. Boor, be granted.

With reference to the report of the Special Committee on the fiftieth Anniversary meeting of this Association, which was referred to the Executive Committee for consideration, we beg to respectfully report as follows:

1. We recommend to the Association the adoption of the suggestion of the Special Committee on Arrangements that no clinic be held in connection with the fiftieth Anniversary meeting at New York.

2. We recommend to the Association that the suggestion of the Special Committee on Arrangements, namely, that the McAlpine Hotel, Thirty-fourth Street and Broadway, New York, be tentatively selected as the headquarters for the anniversary meeting, and that the matter of making definite selection and further arrangements be left in the hands of the Executive Committee and Secretary, with power to act.

3. We recommend to the Association that the sum of $1,500.00 be appropriated from the funds of the Association for the uses of the entertainment committee of the 1913 meeting, the same to be used in connection with invitations to men of prominence in the profession to attend the various sessions and the banquet to be held in connection with the 1913 meeting and for the expenses of such guests as accept these invitations.

4. Your Committee further recommends to the Association that the suggestion of the Special Committee on Arrangements, namely, that the Honorable Professor Alexander Liautard, be made Honorary President of the Fiftieth Anniversary, be adopted.

5. Your Committee further recommends that the suggestion of the Special Committee, that all morning sessions be opened by some man of prominence in the profession, whose work has been linked with the activities of this Association during the past fifty years, and that the five Vice-Presidents of the Association preside in turn at the afternoon sessions, be adopted.

6. On motion, duly seconded and passed, it was voted to recommend to the Association the adoption of the following with reference to the program for the Fiftieth Anniversary and preparation thereof, "that only four or five major subjects of interest to the profession should be considered at said meeting, that the discussion be limited to those particular subjects, and that the

work of preparing the program for the fiftieth meeting be placed with the Secretary and that the Executive Committee be directed to cooperate with, advise and assist the Secretary in the preparation of the program and other features of the meeting."

On motion, duly seconded and passed, it was voted to recommend to the Association that Division B, Section 2, of Article VIII., of the By-Laws, defining the college matriculation requirements in order to render graduates eligible to membership in the Association, and specifying that the course of instruction shall consist of twenty-four months, beginning with the session of 1913-14 be suspended for a period of one year, and that a course of instruction consisting of twenty-one months be substituted for the said period of two years.

There being no further business, the Committee adjourned.

Attest: C. J. MARSHALL, *Secretary.*

SEVENTH MEETING.

A meeting of the Executive Committee was held at the German House, Indianapolis, Indiana, Thursday, August 29, 1912, Dr. E. H. Shepard presiding.

Members Present: Drs. Shepard, White, Marshall, Moore, Van Es, Ackerman and Jensen.

Members Absent: Drs. Nelson, Brenton, Roberts, Turner, Lamb and McGilvray.

On motion, duly seconded and passed, it was voted to recommend to the Association that in future all nominations for officers of the Association be made by a primary system, the details of which shall be worked out by the Committee on Reorganization, and presented at the next annual meeting of the Association.

On motion, duly seconded and passed it was voted to recommend to the Association that the incoming President appoint a committee to investigate modern diagnostic methods for the detection of glanders, and reach an understanding as to the best method for the reduction of said disease.

On motion, duly seconded and passed, it was voted to recommend to the Association that Dr. Robert B. Nixon, D. V. M., Demopolis, Ala. (Alabama Polytechnic Institute, Veterinary Department), vouched for by C. A. Cary and Isaac S. McAdory, be elected to membership.

Attest: C. J. Marshall, *Secretary.*

MEMBERS NEWLY ELECTED.
1912.

ALABAMA.

Robert B. Nixon, D.V.M., Demopolis. (Alabama Polytechnic Institute, Veterinary Department, 1912.) Vouchers, C. A. Cary and I. S. McAdory.

ARKANSAS.

Ronald M. Gow, D.V.M., Fayetteville, (Ohio State University, Veterinary Department, 1909). Vouchers, E. F. Stanford and R. R. Dinwiddie.

CALIFORNIA.

Campbell L. Holt, D.V.M., El Centro. (George Washington University, Veterinary Department, 1912.) Vouchers, J. P. Turner, Robert J. Formad, S. Brenton, President, and C. J. Marshall, Secretary.

John F. McKenna, D.V.S., Fresno. (San Francisco Veterinary College, 1911.) Vouchers, R. A. Archibald and Otis A. Longley.

James F. Mitchell, D.V.M., Berkeley. (New York State Veterinary College, 1911.) Vouchers, C. L. Roadhouse and Charles Keane.

COLORADO.

Walter H. Beck, V.S., Denver. (Ohio State University, Veterinary Department, 1908.) Vouchers, W. E. Howe and J. H. Rietz.

Alexander G. Fisk, D.V.S., Trinidad. (San Francisco Veterinary College, 1906.) Vouchers, I. E. Newsom and Geo. H. Glover.

CONNECTICUT.

Burdette D. Radcliffe, M.D.C., New Britain. (Chicago Veterinary College, 1908.) Vouchers, Grove W. Loveland and Thomas Bland.

DISTRICT OF COLUMBIA.

Admiral Taw Ayers, D.V.M., Washington. (George Washington University, Veterinary Department, 1912.) Vouchers, J. P. Turner and Robert J. Formad.

Joseph N. Hornbaker, D.V.M., Washington. (George Washington University, Veterinary Department, 1911.) Vouchers, J. P. Turner and John R. Mohler.

Hadleigh Marsh, D.V.M., Washington. (George Washington University, Veterinary Department, 1912.) Vouchers, J. P. Turner and John S. Buckley.

Harry W. Schoening, V.M.D., Washington. (University of Pennsylvania, Veterinary Department, 1907.) Vouchers, John R. Mohler and Robert J. Formad.

Hulbert Young, V.M.D., Washington. (University of Pennsylvania, Veterinary Department, 1900.) Vouchers, J. P. Turner and John R. Mohler.

ILLINOIS.

Franklin Adams, D.V.S., Hammond. (Kansas City Veterinary College, 1911.) Vouchers, A. T. Peters and C. C. Mills.

S. S. Baker, M.D.C., Chicago, Ill. (Chicago Veterinary College, 1885.) Vouchers, L. A. Merillat and Dr. Joseph Hughes.

Fred L. Bear, D.V.M., Wheeler. (Terre Haute Veterinary College, 1912.) Vouchers, C. I. Fleming and S. V. Ramsey.

Christian F. Behner, V.S., Marshall. (Ontario Veterinary College, 1894.) Vouchers, S. V. Ramsey and C. I. Fleming.

James W. Burke, M.D.V., Chicago. (McKillip Veterinary College, 1911.) Vouchers, Walter A. Sullivan and J. M. Handley.

J. E. Davis, V.M.D. (Indiana Veterinary College, 1910.) Vouchers W. B. Craig and E. M. Bronson.

Samuel Gilbert Dreppard, D.V.M., Rimard. (Terre Haute Veterinary College, 1912.) Vouchers, C. J. Fleming and O. C. Newgent.

Peter A. Franzmann, D.V.M., Chicago. (Cincinnati Veterinary College, 1909.) Vouchers, J. M. Handley and Walter A. Sullivan.

Robert Gysel, M.D.C., Chicago. (Chicago Veterinary College, 1893.) Vouchers, D. A. Hughes and L. A. Merillat.

Warren E. Heath, D.V.M., Libertyville. (McKillip Veterinary College, 1912.) Vouchers, Charles Frazier and O. F. Butterfield.

Walter B. Holmes, B.S., M.D.C., Springfield. (Chicago Veterinary College, 1911). Vouchers, A. T. Peters and L. A. Merillat.

Robert C. Len, M.D.C., Mascoutah. (Chicago Veterinary College, 1902.) Vouchers, Leo B. Michael and David S. Jaffray, Jr.

Walter James McKillip, M.D.V., Chicago. (McKillip Veterinary College.) Vouchers, George B. McKillip and D. Tencknick.

William R. Michael, M.D.C., Highland. (Chicago Veterinary College, 1901.) Vouchers, Leo. B. Michael and David S. Jaffray, Jr.

Clive Wakon Mooberry, M.D.C., Morton. (Chicago Veterinary College,) Vouchers, A. H. Baker and James Smellie.

William J. Morgan, B.S., M.D.C., Seaton. (Chicago Veterinary College, 1906.) Vouchers, A. H. Baker and L. A. Merillat.

William Sheridan O'Bryan, D.V.M., Pesotam. (Terre Haute Veterinary College, 1912.) Vouchers, S. V. Ramsey and C. I. Fleming.

Archie M. Rockwell, M.D.C., Eleanor, Ill. (Chicago Veterinary College, 1909.) Vouchers, L. A. Merillat and James Smellie.

Charles H. Rosentiel, M.D.C., Freeport. (Chicago Veterinary College, 1903.) Vouchers, L. A. Merillat and Joseph Hughes.

Arthur M. Sherwood, M.D.V., Naperville. (McKillip Veterinary College, 1908.) Vouchers, M. H. McKillip and E. S. Fry.

John L. White, M.D.V., Chicago. (McKillip Veterinary College, 1911.) Vouchers, Chester A. McKillip and Walter A. Sullivan.

INDIANA.

R. C. Applegate, V.M.D., Bloomfield. (Indiana Veterinary College, 1907.) Vouchers, F. A. Bolser and W. B. Craig.

John B. Archer, V.S., Spencer. (Indiana Veterinary College, 1901.) Vouchers, J. W. Klotz and G. H. Roberts.

Raymond Banister, D.V.M., Alert. (Indiana Veterinary College, 1912.) Vouchers, F. A. Bolser and W. B. Craig.

Gilbert E. Botkin, D.V.M., Moreland. (Indiana Veterinary College, 1912.) Vouchers, F. A. Bolser and E. M. Bronson.

Frederick C. Braginton, V.S., V.M.D., Indianapolis. (Ontario Veterinary College, 1892, Indiana Veterinary College, 1911.) Vouchers, J. W. Klotz and G. H. Roberts.

Frank H. Brown, V.M.D., Knighttown. (Indiana Veterinary College, 1910.) Vouchers, F. A. Bolser, G. H. Roberts and J. W. Klotz.

Ralph W. Carmack, V.S., Dana. (Ontario Veterinary College, 1905.) Vouchers, F. A. Bolser and G. H. Roberts.

James Ralston Carson, V.M.D, Cicero. (Indiana Veterinary College, 1907.) Vouchers, G. H. Roberts and J. W. Klotz.

Alva B. Carter, V.S., Covington. (Ontario Veterinary College, 1892.) Vouchers, J. W. Klotz and G. H. Roberts.

Clarence W. Clark, M.D.C., Hagerstown. (Chicago Veterinary College, 1910.) Vouchers, F. A. Bolser and J. W. Klotz.

Edward Cooper, D.V.M., Sunman. (Indiana Veterinary College, 1912.) Vouchers, J. W. Klotz and G. H. Roberts.

W. E. Coover, V.S., Indianapolis. (Ontario Veterinary College, 1903.) Vouchers, O. L. Boor and J. W. Klotz.

Abraham G. Cox, V.S., Carlisle. (Indiana Veterinary College, 1898.) Vouchers, O. L. Boor and J. W. Klotz.

Lee De Motte, V.M.D., Petersburg. (Indiana Veterinary College, 1910.) Vouchers, F. A. Bolser and W. B. Craig.

Quincy C. Dobbins, D.V.M., Bedford. (Indiana Veterinary College, 1912.) Vouchers, J. W. Klotz and G. H. Roberts.

Charles C. Dobson, D.V.M., New Augusta. (Indiana Veterinary College, 1912.) Vouchers, J. W. Klotz and W. B. Craig.

Lester Cortlan Finley, D.V.M., Lapel. (Indiana Veterinary College, 1911.) Vouchers, G. H. Roberts and J. W. Klotz.

Fred W. Graves, D.V.M., New Richmond. (Indiana Veterinary College, 1912.) Vouchers, A. F. Nelson and J. W. Klotz.

Walter H. Gruner, D.V.M., Evansville. (Indiana Veterinary College, 1912.) Vouchers, G. H. Roberts and W. B. Craig.

George W. Hamilton, V.M.D., Southport. (Indiana Veterinary College, 1910.) Vouchers, A. F. Nelson and W. B. Craig.

Howard M. Hamilton, V.M.D., Muncie. (Indiana Veterinary College, 1909.) Vouchers, O. L. Boor and E. M. Bronson.

John B. Heaton, V.S., Indianapolis. (Indiana Veterinary College, 1895.) Vouchers, O. L. Boor and J. W. Klotz.

Lee C. Hoover, D.V.S., Richmond. (Chicago Veterinary College, 1891.) Vouchers, G. H. Roberts and J. W. Klotz.

CLARENCE T. HOWARD, D.V.M., Sullivan. (Indiana Veterinary College, 1907.) Vouchers, C. I. Fleming and O. C. Newgent.

FRANK A. HUGINS, D.V.M., Indianapolis. (George Washington University, Veterinary Department, 1911.) Vouchers, J. W. Klotz and G. H. Roberts.

THOMAS F. HYDE, D.V.M., Brookville. (Indiana Veterinary College, 1912.) Vouchers, R. L. Hanna and G. H. Roberts.

FRANK R. JONES, D.V.M., Indianapolis. (Indiana Veterinary College, 1910.) Vouchers, H. H. George and G. H. Roberts.

C. O. JOYCE, V.M.D., Wanamaker. (Indiana Veterinary College, 1909.) Vouchers, J. W. Klotz and G. H. Roberts.

REN C. JULIEN, M.D.V., Delphi. (McKillip Veterinary College, 1907.) Vouchers, J. W. Klotz and G. H. Roberts.

LAWRENCE C. KIGIN, D.V.M., Rushville. (Indiana Veterinary College, 1909.) Vouchers, F. A. Bolser and G. H. Roberts.

THOMAS F. KIGIN, D.V.M., Tipton. (Indiana Veterinary College, 1910.) Vouchers, A. L. Tyner and J. W. Klotz.

BERT H. LARGENT, D.V.M., Battle Ground. (Indiana Veterinary College, 1912.) Vouchers, G. H. Roberts and J. W. Klotz.

HASKELL LETT, M.D.C., Seymour. (Chicago Veterinary College, 1909.) Vouchers, J. W. Klotz and A. F. Nelson.

CHARLES M. LOMBARD, D.V.M., Indianapolis. (Indiana Veterinary College, 1908.) Vouchers, George W. Butler and Harrison H. George.

PAUL S. LINDLEY, V.S., Paoli. (Indiana Veterinary College, 1904.) Vouchers, J. W. Klotz and O. L. Boor.

J. C. MCDANIEL, D.V.M., Elwood. (Indiana Veterinary College, 1909.) Vouchers, J. W. Klotz and O. L. Boor.

WILLIAM MARQUETTE, D.V.M., Indianapolis. (Indiana Veterinary College, 1912.) Vouchers, G. H. Roberts and J. W. Klotz.

GRANT B. MUNGER, D.V.S. Indianapolis. (Kansas City Veterinary College, 1911.) Vouchers, G. H. Roberts and J. W. Klotz.

LEONARD E. NORTHRUP, D.V.M., Indianapolis. (Indiana Veterinary College, 1911.) Vouchers, G. H. Roberts and W. B. Craig.

FRANKLIN L. PAUL, D.V.M., Burlington. (Indiana Veterinary College, 1907.) Vouchers, J. C. Rodger and J. W. Klotz.

S. C. PHILLIPS, Sheridan. (Indiana Veterinary College, 1907.) Vouchers, G. H. Roberts and J. W. Klotz.

HENRY PIELEMEIER, D.V.M., Freelandville. (Indiana Veterinary College, 1903.) Vouchers, James M. Tade and G. H. Roberts.

CLINTON W. POWER, D.V.M., Attica. (Indiana Veterinary College, 1911.) Vouchers, J. W. Klotz and G. H. Roberts.

SAMUEL V. RAMSEY, JR., D.V.M., Terre Haute. (Terre Haute Veterinary College, 1912.) Vouchers, S. V. Ramsey and C. I. Fleming.

JOHN S. RENO, D.V.M., Southport. (Indiana Veterinary College, 1910.) Vouchers, J. W. Klotz and G. H. Roberts.

PHILIP H. RIEDEL, D.V.M., Indianapolis. (Indiana Veterinary College, 1911.) Vouchers, J. W. Klotz and G. H. Roberts.

ALFRED F. SANDERS, D.V.M., Indianapolis. (Indiana Veterinary College, 1911.) Vouchers, J. W. Klotz and G. H. Roberts.

John A. Schwartz, D.V.M., Lawrence. (Indiana Veterinary College, 1910.) Vouchers, G. H. Roberts and E. M. Bronson.

M. W. Scott, D.V.S., Vincennes. (Indiana Veterinary College, 1900.) Vouchers, James M. Tade and G. H. Roberts.

Presley M. Self, D.V.M., Farmersburg. (Indiana Veterinary College, 1909.) Vouchers, S. V. Ramsey and J. W. Knotz.

LeRoy E. Slater, V.M.D., Worthington. (Terre Haute Veterinary College, 1912.) Vouchers, S. V. Ramsey and C. I. Fleming.

Frank Tiefenthaler, D.V.M., Cambridge City. (Indiana Veterinary College, 1909.) Vouchers, F. A. Bolser and G. H. Roberts.

Grover M. Wagaman, D.V.M., Kokomo. (Indiana Veterinary College, 1912.) Vouchers, J. O. Greeson and W. B. Craig.

William B. Wallace, V.S., Marion. (Ontario Veterinary College, 1887.) Vouchers, O. L. Boor and F. A. Bolser.

Claude P. Wilson, V.S., Greenfield. (Indiana Veterinary College, 1895.) Vouchers, E. M. Bronson and G. H. Roberts.

IOWA.

Carl L. Gamrath, D.V.M. (Iowa State College, Veterinary Division, 1909.) Vouchers, Calvin S. Evans and W. M. Gordon.

Howard R. Gibson, D.V.M., Algona. (Ohio State University, Veterinary Department, 1912.) Vouchers, J. D. Fair, Louis P. Cook, S. Brenton and C. J. Marshall.

G. G. Graham, D.V.M., Ames. (Iowa State College, Veterinary Division, 1908.) Vouchers, Robert Graham and L. M. Land.

Charles E. Harry, M.D.C., Adair. (Chicago Veterinary College, 1911.) Vouchers, H. A. Alcorn and Hal C. Simpson.

A. I. Kulp, D.V.M., Adel. (Iowa State College, Veterinary Division, 1909.) Vouchers, W. W. Dimock and C. H. Stange.

Rex C. Louck, D.V.M., Clarence. (Iowa State College, Veterinary Division, 1912.) Vouchers, H. E. Bemis and C. H. Stange.

Howard S. Murphy, D.V.M., Ames. (Ohio State University, Veterinary Department, 1908.) Vouchers, W. W. Dimock and C. H. Stange.

N. Lewis Nelson, D.V.M., Ames. (Iowa State College, Veterinary Division, 1911.) Vouchers, W. W. Dimock and C. H. Stange.

H. L. Stewart, M.D.C., Lacona. (Chicago Veterinary College, 1894.) Vouchers, Hal C. Simpson and C. H. Stange.

KANSAS.

Lebbens B. Barber, D.V.M., Wamego. (Kansas State Agricultural College, Veterinary Division, 1911.) Vouchers, K. W. Stouder and J. F. Hemphill.

James H. Burt, D.V.M., Manhattan. (Ontario Veterinary College, 1895, Ohio State University, Veterinary Department, 1905.) Vouchers, K. W. Stouder and J. F. Hemphill.

Ralph R. Dykstra, D.V.M., Manhattan. (Iowa State College, Veterinary Division, 1905.) Vouchers, F. S. Schoenleber and K. W. Stouder.

Charles B. Kern, V.S., Beloit. (Ontario Veterinary College, 1903.) Vouchers, K. W. Stouder and F. S. Schoenleber.

Edson F. Kubin, D.V.M., McPherson. (Kansas State Agricultural College, Veterinary Division, 1909.) Vouchers, K. W. Stouder and J. F. Hemphill.

William A. Pulver, D.V.M., Wamego. (Kansas State Agricultural College, Veterinary Division, 1912.) Vouchers, K. W. Stouder and J. F. Hemphill.

Wilfred J. Stokes, M.D.V., Fort Riley. (McKillip Veterinary College, 1907.) Vouchers, Alexander Plummer and Walter Fraser.

Otis E. Strodtman, D.V.S., Arkansas City. (Kansas City Veterinary College, 1911.) Vouchers, K. W. Stouder and J. F. Hemphill.

KENTUCKY.

Otto S. Crisler, V.M.D., Newport. (Indiana Veterinary College, 1910.) Vouchers, F. T. Eisenman and Alexander Harthill.

John K. Ditts, D.V.M., Pleasureville. (Cincinnati Veterinary College, 1910.) Vouchers, F. T. Eisenman and Alexander Harthill.

Lewis W. McElyea, D.V.M., Lexington. (Iowa State College, Veterinary Division, 1911.) Vouchers, Robert Graham and L. M. Land.

S. F. Musselman, V.S., Cynthians. (Ontario Veterinary College, 1894.) Vouchers, F. T. Eisenman and Alexander Harthill.

Marion A. Purdy, M.D., D.V.S., Shelbyville. (Chicago Veterinary College, 1909.) Vouchers, F. T. Eisenman and Joseph Hughes

William H. Simmons, V.S., Louisville. (Ontario Veterinary College, 1892.) Vouchers, F. T. Eisenman and Alexander Harthill.

Charles G. Warner, M.D.C., Paducah. (Chicago Veterinary College, 1898.) Vouchers, F. T. Eisenman and Alexander Harthill.

Frank A. Wehlé, V.S., Lexington. (Ontario Veterinary College, 1904.) Vouchers, F. T. Eisenman and Alexander Harthill.

LOUISIANA.

Hamblet Moore, V.S., New Orleans. (Ontario Veterinary College, 1898.) Vouchers, J. Arthur Goodwin, S. Brenton and C. J. Marshall.

MAINE.

Henry B. Wescott, V.M.D., Portland. (University of Pennsylvania, Veterinary Department, 1912.) Vouchers, A. Joly and G. F. Wescott.

MARYLAND.

Frank H. Benjamin, D.V.M., North East. (George Washington University, Veterinary Department, 1912.) Vouchers, J. P. Turner, H. P. Eves, S. Brenton and C. J. Marshall.

Chauncey M. Grubb, D.V.M., Rockville. (George Washington Uni-

versity, Veterinary Department, 1911.) Vouchers, J. P. Turner and F. H. Mackie.

John G. Hopper, V.M.D., Chesapeake City. (University of Pennsylvania, Veterinary Department, 1911.) Vouchers, J. D. Fair, S. Brenton and C. J. Marshall.

C. E. Poe, V.S., Hagerstown. (Ontario Veterinary College, 1902.) Vouchers, F. H. Mackie and C. L. Mackie.

MASSACHUSETTS.

William J. Hennessey, V.S., Worcester. (Ontario Veterinary College, 1899.) Vouchers, L. A. Paquin and C. H. Playdon.

Edward F. Ryan, V.M.D., Brookline. (University of Pennsylvania, Veterinary Department, 1908.) Vouchers, J. F. Winchester and F. Abele.

MICHIGAN.

Charles F. Birmingham, D.V.S., Ovid. (Kansas City Veterinary College, 1911.) Vouchers, Horace M. Gohn and James J. Joy.

Edwin B. Cavell, V.S., Northville. (Ontario Veterinary College, 1906.) Vouchers, W. L. Brenton and S. Brenton.

Martin E. Elzinger, D.V.S., Grand Rapids, Mich. (Detroit College of Medicine, Veterinary Department, 1897.) Vouchers, H. L. Schuh and Robertson Muir.

W. Austin Ewalt, B.V.S., Mt. Clemens. (Ontario Veterinary College, 1912.) Vouchers, S. Brenton and J. J. Joy.

James W. G. Hansen, D.V.M., Greenville. (Grand Rapids Veterinary College, 1906.) Vouchers, H. L. Schuh and Robertson Muir.

Ogden J. Howard, D.V.M., Coloma. (Indiana Veterinary College, 1910.) Vouchers, S. Brenton and James J. Joy.

Samuel Irwin, V.S., Battle Creek. (Ontaria Veterinary College, 1890.) Vouchers, S. Brenton and James J. Joy.

Theodore Frederick Krey, D.V.S., Detroit. (Two years at Ontario Veterinary College, and New York-American Veterinary College, 1898.) Vouchers, S. Brenton and James J. Joy.

Seymour V. Lewis, D.V.M., Suttons Bay. (Grand Rapids Veterinary College, 1912.) Vouchers, Robertson Muir and H. L. Schuh.

John S. McDaniel, B.Sc., D.V.S., East Lansing. (Kansas City Veterinary College, 1909.) Vouchers, F. W. Chamberlain and R. P. Lyman.

C. C. Mix, M.D.C., V.S., Battle Creek, (Ontario Veterinary College, 1906.) Vouchers, S. Brenton and James J. Joy.

Martin Olthouse, D.V.M., Grass Lake. (Grand Rapids Veterinary College, 1912.) Vouchers, H. L. Schuh and Robertson Muir.

Gunerius M. Pederson, D.V.M., Pittsford. (Chicago Veterinary College, 1912.) Vouchers, J. C. Whitney and S. Brenton.

Fred A. Spade, D.V.M., White Pigeon. (Grand Rapids Veterinary College, 1907.) Vouchers, Arthur H. Moody, Payson Schwin, S. Brenton and C. J. Marshall.

JOHN E. WARD, D.V.S., Perry, Mich. (Detroit College of Medicine, Veterinary Department, 1896.) Vouchers, H. L. Schuh and Robertson Muir.

ROBERT H. WILSON, D.V.M., Rochester. (Kansas State Agricultural College, Veterinary Division, 1909.) Vouchers, George W. Dunphy and S. Brenton.

MINNESOTA.

MICHAEL J. SEXTON, V.S., Minneapolis. (Ontario Veterinary College, 1895.) Vouchers, F. D. Ketchum and Charles E. Cotton.

MISSOURI.

GEORGE ERNEST BARTHOLOMIES, D.V.S., Kansas City. (Kansas City Veterinary College, 1911.) Vouchers, S. Stewart and R. F. Bourne.

ATVILL BYRD, D.V.S., Kansas City. (Kansas City Veterinary College, 1903.) Vouchers, F. F. Brown and J. V. Lacroix.

FRED W. CALDWELL, D.V.M., St. Joseph. (Kansas State Agricultural College, Veterinary Division, 1907.) Vouchers, Charles I. Walch and C. M. McFarland

EDWARD C. CARLE, D.V.M., St. Joseph. (Cincinnati Veterinary College, 1904.) Vouchers, Charles I. Walch and T. A. Shipley.

HUGH L. DWYER, D.V.S., Kansas City. (Kansas City Veterinary College, 1911.) Vouchers, S. Stewart and H. Jensen.

CLARENCE L. ELLIOTT, D.V.M., South St. Joseph. (Iowa State College, Veterinary Division, 1902.) Vouchers, C. M. McFarland and C. I. Walch.

CARL F. FISCHER, D.V.M., Garden City. (Kansas City Veterinary College, 1912.) Vouchers, F. F. Brown and J. V. Lacroix.

ALBERT D. GLOVER, D.V.S., LaBelle, (Kansas City Veterinary College, 1911.) Vouchers, S. Stewart and F. F. Brown.

HARRY J. HOYMAN, M.D.C., South St. Joseph. (Chicago Veterinary College, 1904.) Vouchers, B. W. Murphy and T. A. Shipley.

WILBUR PIERRET, D.V.M., South St. Joseph. (Cincinnati Veterinary College, 1911.) Vouchers, B. W. Murphy and T. A. Shipley.

JOHN R. POOLEY, D.V.S., St. Joseph. (Kansas City Veterinary College, 1910). Vouchers, C. M. McFarland and C. I. Walch.

C. E. SALISBURY, D.V.S., Kansas City. (Kansas City Veterinary College, 1911). Vouchers, A. T. Kinsley and R. F. Bourne. (Provisional.)

HARRY C. WARD, M.D.C., Perry. (Chicago Veterinary College, 1910). Vouchers, B. W. Murphy and T. A. Shipley.

MONTANA.

ALBERT C. MORROW, D.V.M., Dillon. (Ohio State University, Veterinary Department, 1911). Vouchers, A. D. Knowles and Walter J. Taylor.

NEBRASKA.

John T. Buchtel, D.V.S., Tecumseh. (Kansas City Veterinary College, 1911). Vouchers, A. Bostrom and J. H. Gain.

A. E. Hasselbalch, D.V.M., St. Edward. (Kansas City Veterinary College, 1912). Vouchers, A. Bostrom and Wm. G. Keehn.

Gustave A. Kay, M.D.C., South Omaha. (Chicago Veterinary College, 1902). Vouchers, C. L. Norris and Frank Jelen.

Harvey L. Prouse, D.V.S., Allen. (Kansas City Veterinary College, 1910). Vouchers, A. Bostrom and J. D. Sprague.

George Sheridan, D.V.S., Ashland. (Kansas City Veterinary College, 1911). Vouchers, A. Bostrom and J. H. Gain.

Joseph E. Strayer, D.V.S., Hartington. (Kansas City Veterinary College, 1906). Vouchers, A. Bostrom and J. H. Gain.

NEVADA.

George E. Bamberger, M.D.C., Reno. (Chicago Veterinary College, 1909.) Vouchers, W. J. Stewart and W. B. Mack.

Virgil W. Knowles, D.V.S., Elko. (Kansas City Veterinary College, 1907). Vouchers, W. J. Stewart and W. B. Mack.

NEW HAMPSHIRE.

George Darwin Darrah, M.D.C., Manchester. (Chicago Veterinary College, 1911). Vouchers, H. Lewis and Francis S. Allen.

NEW YORK.

Charles M. Casey, V.S., New York City. (Ontario Veterinary College, 1906). Vouchers, Robert W. Ellis, S. Brenton and C. J. Marshall.

Charles S. Chase, D.V.S., Bay Shore. (New York-American Veterinary College, 1906). Vouchers, Robert W. Ellis, S. Brenton and C. J. Marshall.

Ralph W. Clere, V.S., East Syracuse. (Ontario Veterinary College, 1906). Vouchers, Robert W. Ellis, S. Brenton and C. J. Marshall.

John H. Darrow, Jr., V.M.D., Poughkeepsie. (University of Pennsylvania, Veterinary Department, 1912). Vouchers, Otto Faust and C. A. Roig.

Charles T. Fake, D.V.M., Hudson Fall. (George Washington University, Veterinary Department, 1912). Vouchers, J. P. Turner and Robert J. Formad.

Clifford P. Fitch, M.S., D.V.M., Ithaca. (New York State Veterinary College, 1911). Vouchers, V. A. Moore and S. H. Burnett.

Frederic S. Jones, V.M.D., Ithaca. (University of Pennsylvania, Veterinary Department, 1908). Vouchers, V. A. Moore and S. H. Burnett.

Henry W. Skerritt, V.S., Utica. (Ontario Veterinary College, 1890). Vouchers, W. G. Hollingworth and Wilson Huff.

NORTH CAROLINA.

WATT ASHCRAFT, M.D.C., Monroe. (Chicago Veterinary College, 1906). Vouchers, M. J. Ragland and G. A. Roberts.

JOHN L. BULLOCK, D.V.S., Creedmoor. (Kansas City Veterinary College, 1911). Vouchers, M. J. Ragland and G. A. Roberts.

LAFAYETTE F. KOONCE, B.S., D.V.M., Raleigh. (Kansas City Veterinary College, 1909). Vouchers, G. A. Roberts and M. J. Ragland.

BENNETT T. SIMMS, D.V.M., West Raleigh. (Alabama Polytechnic Institute, College of Veterinary Medicine, 1911). Vouchers, G. A. Roberts and M. J. Ragland.

TRACY N. SPENCER, D.V.S., Concord. (Kansas City Veterinary College, 1911). Vouchers, M. J. Ragland and G. A. Roberts.

NORTH DAKOTA.

CHAS H. BABCOCK, M.D.V., New Rockford. (McKillip Veterinary College, 1908). Vouchers, W. F. Crewe and L. Van Es.

LESTER A. BENSON, V.S. (Ontario Veterinary College, 1907). Vouchers, W. F. Crewe and L. Van Es.

JOSEPH W. E. BRYANS, V.S., Lansford. (Ontario Veterinary College, 1907). Vouchers, E. J. Walsh and W. F. Crewe.

JOSEPH E. CARTER, D.V.S., Fargo. (Kansas City Veterinary College, 1908). Vouchers, W. F. Crewe and L. Van Es.

FRANK L. CUSACK, M.D.C., Carrington. (Chicago Veterinary College, 1897). Vouchers, W. F. Crewe and L. Van Es.

GEORGE H. DAVIDSON, V.S., Rugby. (Ontario Veterinary College, 1898). Vouchers, W. F. Crewe and L. Van Es.

FRANCIS F. DOLAN, M.D.C., Willow City. (Chicago Veterinary College, 1910). Vouchers, W. F. Crewe and L. Van Es.

HERMAN M. EISENLOHR, M.D.V., Larimore. (Grand Rapids Veterinary College, 1912). Vouchers, L. Van Es and W. F. Crewe.

ADAM F. ELLIOTT, V.S., Milton. (Ontario Veterinary College, 1896). Vouchers, W. F. Crewe and L. Van Es.

EDWARD W. ELLIOTT, V.S., B.V.Sc., Park River. (Ontario Veterinary College, 1910.) Vouchers, John H. McLain and W. F. Crewe.

CHARLES H. HART, M.D.C., McHenry. (Chicago Veterinary College, 1911). Vouchers, W. F. Crewe and L. Van Es.

JAMES A. LOGAN, M.D.C., Oakes. (Chicago Veterinary College, 1910). Vouchers, W. F. Crewe and L. Van Es.

CLARENCE T. MCPIKE, D.V.M., Cando. (Chicago Veterinary College, 1912). Vouchers, W. F. Crewe and L. Van Es.

PEARLEY E. NULPH, D.V.M., Wyndmare. (Grand Rapids Veterinary College, 1912). Vouchers, L. E. McDonnell and W. F. Crewe.

G. E. SLOULIN, V.S., Aneta. (Ontario Veterinary College, 1907). Vouchers, W. F. Crewe and L. Van Es.

EUGENE R. SWENSON, V.S., Esmond. (Ontario Veterinary College, 1911). Vouchers, W. F. Crewe and L. Van Es.

JOHN F. SYLVESTER, V.S., M.D.V., Langdon. (Ontario Veterinary Col-

lege, 1901, and McKillip Veterinary College, 1902). Vouchers, W. F. Crewe and L. Van Es.

OHIO.

JAMES F. BARNES, D.V.S., Toledo. (Detroit College of Medicine, Veterinary Department, 1893). Vouchers, S. Brenton and C. J. Marshall.

H. P. BASSINGER, D.V.M., Columbus Grove. (Grand Rapids Veterinary College, 1912). Vouchers, R. I. Bernath and J. H. Blattenberg.

E. L. BERTRAM, V.S., Cincinnati. (Ontario Veterinary College, 1897). Vouchers, J. D. Fair and Louis P. Cook.

STANTON E. BRETZ, D.V.S., Nevada. (Chicago Veterinary College, 1888). Vouchers, J. D. Fair and E. H. Shepard.

FRANK R. BUTZ, D.V.M., Cincinnati. (Cincinnati Veterinary College, 1911). Vouchers, J. D. Fair and Louis P. Cook.

CLAUDE H. CASE, D.V.M., Akron. (Ohio State University, Veterinary Department, 1904). Vouchers, J. D. Fair and E. H. Shepard.

GEORGE H. CHANDLER, M.D.C., Marseilles. (Chicago Veterinary College, 1895). Vouchers, J. D. Fair and E. H. Shepard.

CURTIS A. CLARK, V.S., College Corner. (Indiana Veterinary College, 1903). Vouchers, J. W. Klotz and G. H. Roberts, S. Brenton and C. J. Marshall.

W. E. CLEMONS, V.S., Granville. (Ontario Veterinary College, 1900.) Vouchers, G. W. Cliffe and Louis P. Cook.

J. M. COOPER, M.D.V., Cincinnati. (McKillip Veterinary College, 1911.) Vouchers, John C. Meyer and Louis P. Cook.

PETER T. GILLIE, V.S., Mansfield. (Ohio State University, Veterinary Department, 1910.) Vouchers, J. D. Fair and L. P. Cook.

ROSCOE C. GRIFFITH, M.D.C., Jamestown. (Chicago Veterinary College, 1911.) Vouchers, J. D. Fair and L. P. Cook.

FRANCIS A. HARSH, V.S., Minerva. (Ontario Veterinary College, 1894.) Vouchers, J. D. Fair and L. P. Cook.

ALVY M. HOEHN, D.V.M., Cincinnati. (Cincinnati Veterinary College, 1911.) Vouchers, J. D. Fair and Louis P. Cook.

JAMES H. KELLEY, V.S., Cleveland. (Ontario Veterinary College, 1891.) Vouchers, Paul Fischer and Morgan B. Lamb.

WILLIAM N. KINNEY, V.S., Wooster. (Ontario Veterinary College, 1892.) Vouchers, J. D. Fair and L. P. Cook.

WILLIAM N. LAVIERS, V.S., Dalton. (Ontario Veterinary College, 1907.) Vouchers, J. D. Fair and Louis P. Cook.

C. DOUGLAS MCCORMACK, V.S., North Baltimore. (Ontario Veterinary College, 1906.) Vouchers, F. E. Anderson and J. D. Fair.

RICHARD EMIL MOEGLING, D.V.M., Cincinnati. (Cincinnati Veterinary College, 1910.) Vouchers, E. H. Shepard and Louis P. Cook.

FRANK L. MOYER, V.S., Carey. (Ohio State University, Veterinary Department, 1900.) Vouchers, F. E. Anderson and E. H. Shepard.

WILLIAM G. O'HARRA, D.V.M., Alton. (Ohio State University, Veterinary Department, 1910.) Vouchers, J. D. Fair and L. P. Cook.

ELMER J. RENTER, D.V.M., Cincinnati. (Cincinnati Veterinary College, 1910.) Vouchers, J. D. Fair and Louis P. Cook.

George A. Riembaugh, V.S., Millersburg. (Ontario Veterinary College, 1907.) Vouchers, J. D. Fair and Louis P. Cook.

Harry B. Ropp, D.V.M., Ashland. (Indiana Veterinary College, 1910.) Vouchers, J. D. Fair and E. H. Shepard.

William Sanderson, V.S., M.D.V., Sidney. (Ontario Veterinary College, 1901; McKillip Veterinary College, 1903.) Vouchers, J. D. Fair and E. H. Shepard.

Clifford C. Sockman, D.V.M., Deshler. (Ohio State University, Veterinary Department, 1906.) Vouchers, J. D. Fair and Louis P. Cook.

C. H. Solt, V.S., Arlington. (Ontario Veterinary College, 1905.) Vouchers, J. D. Fair and E. H. Shepard.

Otis L. Sutton, D.V.M., Cincinnati. (Cincinnati Veterinary College, 1911.) Vouchers, J. D. Fair and Louis P. Cook.

John E. Turner, V.S., Kenton. (Ohio State University, Veterinary Department, 1909.) Vouchers, J. H. Blattenberg and J. D. Fair.

Edward F. Westerheide, D.V.M., Minster. (Grand Rapids Veterinary College, 1910.) Vouchers, J. D. Fair, S. Brenton and C. J. Marshall.

Earl L. Williman, D.V.M., Ohio City. (Grand Rapids Veterinary College, 1911.) Vouchers, J. D. Fair and E. H. Shepard.

William F. Wise, V.S., Medina. (Ontario Veterinary College, 1907.) Vouchers, H. Fulstow and G. W. Cliffe.

Paul E. Wood, D.V.M., Rimer. (Grand Rapids Veterinary College, 1911.) Vouchers, J. D. Fair and L. P. Cook.

PENNSYLVANIA.

Miller F. Barnes, V.M.D., Media. (University of Pennsylvania, Veterinary Department, 1911.) Vouchers, David McKibbin, Jr., and C. J. Marshall.

Edward E. Behrens, V.M.D., (University of Pennsylvania, Veterinary Department, 1912.) Vouchers, David McKibbin, Jr., and C. J. Marshall.

Barclay F. Carter, V.M.D., Norristown. (University of Pennsylvania, Veterinary Department, 1912.) Vouchers, C. J. Marshall and Henry Marshall.

Walter J. Crocker, V.M.D., Philadelphia. (University of Pennsylvania, Veterinary Department, 1911.) Vouchers, C. J. Marshall and J. A. McCloskey.

Ernest C. Deubler, V.M.D., Media. (University of Pennsylvania, Veterinary Department, 1911.) Vouchers, David McKibbin, Jr., and C. J. Marshall.

John J. Graham, V.M.D., Germantown. (University of Pennsylvania, Veterinary Department, 1909.) Vouchers, J. A. McCloskey and C. J. Marshall.

Cheston M. Hoskins, V.M.D., Philadelphia. (University of Pennsylvania, Veterinary Department, 1911.) Vouchers, Harry B. Cox and C. J. Marshall.

Thomas D. James, V.M.D., Scranton. (University of Pennsylvania, Veterinary Department, 1908.) Vouchers, Jacob Helmer and F. H. Schneider.

HENRY LEUTHOLT, M.D.C., Taylor. (Chicago Veterinary College, 1895.) Vouchers, Jacob Helmer and F. H. Schneider.

DANIEL S. MILLER, V.M.D., Philadelphia. (University of Pennsylvania, Veterinary Department, 1912.) Vouchers, C. J. Marshall and Louis A. Klein.

EDWARD RECORDS, V.M.D., Glenolden. (University of Pennsylvania, Veterinary Department, 1909.) Vouchers, David McKibbin, Jr., and C. J. Marshall.

IRVIN S. REIFSNYDER, V.M.D., Collegeville. (University of Pennsylvania, Veterinary Department, 1911.) Vouchers, David McKibbin, Jr., and C. J. Marshall.

HOWARD REYNOLDS, D.V.M., Factoryville. (Ohio State University, Veterinary Department, 1904.) Vouchers, Jacob Helmer and F. H. Schneider.

FREDERICK STEHLE, JR., V.M.D., Philadelphia. (University of Pennsylvania, Veterinary Department, 1901.) Vouchers, W. H. Ridge and C. J. Marshall.

HENRY W. TURNER, V.M.D., New Hope. (University of Pennsylvania, Veterinary Department, 1893.) Vouchers, W. H. Ridge and C. J. Marshall.

WILLIAM T. WEBB, V.M.D., Quarryville. (University of Pennsylvania, Veterinary Department, 1907.) Vouchers, R. C. Gross and H. Preston Hoskins.

JOHN H. WINSTANLEY, V.M.D., Philadelphia. (University of Pennsylvania, Veterinary Department, 1910.) Vouchers, W. H. Ridge and C. J. Marshall.

PHILIPPINE ISLANDS.

J. ELDORAS BARD, V.S., Manila. (Ohio State University, Veterinary Department, 1904.) Vouchers, A. R. Ward and Ralph F. Knight.

WILLIAM L. DAVIS, B.S., D.V.S., Manila. (Kansas City Veterinary College, 1910.) Vouchers, A. R. Ward and Ralph F. Knight.

LAWRENCE W. FISCHER, D.V.M., Manila. (Ohio State University, Veterinary Department, 1911.) Vouchers, A. R. Ward and Ralph F. Knight.

A. DALE MILLER, D.V.M., Manila. (Ohio State University, Veterinary Department, 1910.) Vouchers, Ralph F. Knight and A. R. Ward.

DONALD B. PALMER, D.V.M., Manila. (Iowa State College, Veterinary Division, 1911.) Vouchers, A. R. Ward and Frank C. Gearhart.

SOUTH DAKOTA.

ANDREW F. REICHMANN, M.D.C., Armour. (Chicago Veterinary College, 1906.) Vouchers, S. W. Allen and H. M. Halverson.

FERDINAND A. REICHMAN, M.D.C., Geddes. (Chicago Veterinary College, 1910.) Vouchers, S. W. Allen and H. M. Halverson.

TENNESSEE.

WALTER MITCHELL GILES, M.D.V., Franklin. (McKillip Veterinary College, 1910.) Vouchers, M. Jacobs and George R. White.

B. Franklin Morey, D.V.M., Martin. (Terre Haute Veterinary College, 1912.) Vouchers, C. I. Fleming and S. V. Ramsey.

TEXAS.

Frank E. Barnes, D.V.S., Waxahachie. (Kansas City Veterinary College, 1909.) Vouchers, R. P. Marstellar and J. G. Perry.

F. G. Cook, D.V.S., Paris. (Western Veterinary College of Kansas City, 1902.) Vouchers, R. P. Marstellar and M. Francis.

Ralph Clark Dunn, D.V.M., College Station. (Ohio State University, Veterinary Department.) Vouchers, M. Francis and R. P. Marstellar.

William T. Huffnall, V.M.D., Paris. (Indiana Veterinary College, 1911.) Vouchers, R. P. Marstellar and M. Francis.

Fred S. Molt, D.V.M., Cooper. (Indiana Veterinary College, 1912.) Vouchers, R. P. Marstellar and M. Francis.

VERMONT.

Guy N. Welch, V.S., Northfield. (Ontario Veterinary College, 1903.) Vouchers, F. A. Rich and Robert Weir.

VIRGINIA.

Ralph E. Christopher M.D.V., V.S., Norfolk. (Ontario Veterinary College, 1906; McKillip Veterinary College, 1907.) Vouchers, George C. Faville and Wm. G. Chrisman.

John P. DeVine, D.V.M., Ballston. (George Washington University, Veterinary Department, 1911.) Vouchers, George C. Faville and R. R. Clark.

James G. Ferneyhough, B.S., D.V.S., Burkville, Va. (U. S. College Veterinary Surgeons, Washington, D. C., 1899; (Virginia Polytechnic Institute, B.S. Degree.) Vouchers, George C. Faville.

Thomas Fraser, V.S., Richmond. (Ontario Veterinary College.) Vouchers, George C. Faville and R. R. Clark.

WASHINGTON.

Robert J. Donohue, D.V.S., Ellensburg. (Washington State College, Veterinary Division, 1912.) Vouchers, S. B. Nelson, S. Brenton and C. J. Marshall.

Edward J. Drake, D.V.S., Toledo. (Kansas City Veterinary College, 1906.) Vouchers, J. T. Seeley and S. B. Nelson.

Elmer V. Edmonds, D.V.S., Mount Vernon. (Washington State College, Veterinary Department, 1911.) Vouchers, Chas. S. Phillips and A. J. Damman.

Robert Prior, D.V.S., North Yakima. (Washington State College, Veterinary Department, 1912.) Vouchers, S. B. Nelson and A. J. Damman.

WEST VIRGINIA.

John J. Cranwell, M.D.C., Clarksburg. (Chicago Veterinary College, 1907.) Vouchers, L. N. Reefer, S. Brenton and C. J. Marshall.

Truman E. Gore, V.S., Clarksburg. (Ontario Veterinary College, 1895.) Vouchers, L. N. Reefer, S. Brenton and C. J. Marshall.

S. E. Hershey, V.S., Charleston. (Kingston, Ont., Veterinary Department, 1898; Post-Graduate Course, Kansas City Veterinary College, 1905.) Vouchers, L. N. Reefer, S. Brenton and C. J. Marshall.

WISCONSIN.

Daniel L. Cowgill, M.D.C., Rio. (Chicago Veterinary College, 1907.) Vouchers, W. G. Clark and W. H. Dreher.

Charles A. Deadman, D.V.S., M.S., Madison. (Grand Rapids Veterinary College, 1903.) Vouchers, O. H. Eliason and W. G. Clark.

Thomas H. Ferguson, V.S., Lake Geneva. (Ontario Veterinary College, 1896.) Vouchers, O. H. Eliason and W. G. Clark.

Harry R. Fosbinder, M.D.C., Mauston. (Chicago Veterinary College, 1910.) Vouchers, W. G. Clark and C. E. Evans.

James F. Kennedy, M.D.V., Bloomington. (McKillip Veterinary College, 1907.) Vouchers, W. G. Clark and C. E. Evans.

William J. Malone, M.D.C., Mount Horeb. (Chicago Veterinary College, 1896.) Vouchers, H. F. Eckert and W. G. Clark.

Homer D. Pattison, M.D.C., Beloit. (Chicago Veterinary College, 1904.) Vouchers, W. G. Clark and L. A. Wright.

Paul L. Robinson, M.D.C., Beloit. (Chicago Veterinary College, 1909.) Vouchers, W. G. Clark and J. P. West.

WYOMING.

Hugh R. Millard, D.V.M., Cheyenne. (New York State Veterinary College, 1911.) Vouchers, B. F. Davis and Veranus A. Moore, S. Brenton and C. J. Marshall.

ALBERTA, CANADA.

Michael Vincent Gallivan, V.S., Lethbridge. (Queen's University, Veterinary Department, 1898.) Vouchers, J. C. Hargrave and E. A. Watson.

William R. Hawke, V.S., Medicine Hat. (Ontario Veterinary College, 1905.) Vouchers, J. C. Hargrave and E. A. Watson.

Anton E. Knap, V.S., Lethbridge. (Royal Veterinary College of Denmark, 1903.) Vouchers, J. C. Hargrave and E. A. Watson.

Percy R. Talbot, V.S., Calgary. (Ontario Veterinary College, 1907.) Vouchers, Robert Riddell and J. C. Hargrave.

MANITOBA, CANADA.

Robert D. MacIntosh, B.V.Sc., Winnipeg. (Ontario Veterinary College, 1911.) Vouchers, C. D. McGilvray and Will A. Hilliard.

ONTARIO, CANADA.

G. B. Cash, V.S., B.V.Sc., Toronto. (Ontario Veterinary College, 1910.) Vouchers, W. J. R. Fowler, S. Brenton and C. J. Marshall.

John Burton Hollingsworth, D.V.S., Ottawa. (McGill University, Veterinary Department, 1898.) Vouchers, Thomas Thacker and Will A. Hilliard.

Roy Riddle, V.S., Norwich. (Ontario Veterinary College, 1907.) Vouchers, E. A. A. Grange and W. J. R. Fowler.

Bert C. Smith, V.S., Brigden. (Ontario Veterinary College, 1903.) Vouchers, Judson Black, W. L. Brenton, S. Brenton and C. J. Marshall.

QUEBEC, CANADA.

Angus W. Tracy, D.V.S., Sherbrooke. (McGill University, Veterinary Department, 1893.) Vouchers, J. D. Whyte and M. C. Baker.

SASKATCHEWAN, CANADA.

George H. Acres, D.V.S., Marienthal. (Ontario Veterinary College, 1900.) Vouchers, D. Tamblyn and John F. Burnett.

Allister C. Blackwood, V.S., B.V.Sc., Moose Jaw. (Ontario Veterinary College, 1911.) Vouchers, D. Tamblyn and John F. Burnett.

Norman D. Christie, V.S., B.V.Sc., Wood Mountain. (Ontario Veterinary College, 1910.) Vouchers, D. Tamblyn and John F. Burnett.

REPORT OF COMMITTEE ON DISEASES.

J. R. Mohler, *Chairman.*

C. H. Higgins, Ward Giltner,
C. E. Cotton, S. H. Burnett.

To the President and Members of the Association:

This year your Committee on Diseases has not been limited by resolution or otherwise to any special field of veterinary medicine or to any particular disease upon which to base its report. Although the duty of this committee is "to investigate the character and extent of prevalent diseases throughout America," no elaborate statistics will be offered concerning the prevalence of any disease because of the impossibility of obtaining reliable data upon such a stupendous subject with the means at our disposal,

and further because such figures without a careful analytical study are apt to be misleading and valueless. It is therefore the desire of your committee this year to call the attention of the Association to some facts regarding the appearance of a few of the more important infective diseases in this and other countries. In addition to the general report there will be supplementary contributions by the following members of this committee:

"Anthrax Vaccines"—By Chas. H. Higgins, Ottawa, Canada.

"Contagious Abortion in Cattle"—By Ward Giltner, Lansing, Mich.

"Sclerostomatosis of the Arteries in the Horse"—By S. H. Burnett, Ithaca, N. Y.

Owing to the character of these contributions they have been referred to the Section on Sanitary Science and Police for presentation. [See Papers and Discussions.]

FOOT-AND-MOUTH DISEASE.

Unlike in this country the statistics of contagious animal diseases in foreign countries, particularly the European, are published at stated intervals by the sanitary authorities who maintain supervision over the live stock.

A review of these reports will show that the great disturbing factor in the European situation during the past year has been foot-and-mouth disease. Two years ago the whole of western and central Europe was free from this troublesome malady, but the disease suddenly appeared and being so extremely contagious has continued to occur from time to time in spite of strict vigilance. The visitation of 1911 was unusually severe. During the summer a tremendous wave of the disease passed over the whole of continental Europe, probably the greatest epizootic that has ever taken place. Even England, where the most strenuous efforts are put forth to exclude it, had to deal with no less than nineteen outbreaks during the year.

The rapidity with which foot-and-mouth disease can invade the farm stock in a country, notwithstanding measures to control it by a well organized sanitary force, unless the slaughter of all infected animals is adopted, is illustrated by the Belgium reports. Here the disease first appeared in February, 1911, and did not make serious headway until June, yet at the end of the year the total number of animals reported infected amounted to approx-

imately fourteen per cent of all the susceptible animals in Belgium. It has been stated that the disease originated in Russia spreading into Saxony and Prussia and later by degrees over the greater part of the German Empire. At the same time Austria and Hungary were likewise severely attacked by the disease, presumably also through infection from Russia, and these countries were over-ridden with the disease. The infection which was especially severe spread to Italy, Switzerland, France, Holland, Belgium, Denmark, Sweden and Great Britain, and quite recently to Ireland.

On July 5, 1911, the ports of the United States were closed for the importation of cattle from Great Britain and Ireland owing to the appearance of foot-and-mouth disease there. On January 5, 1912, the embargo was raised for Ireland and the Channel Islands, and three months after the last appearance of foot-and-mouth disease in England, or on March 11, 1912, the ports were reopened for live stock from any port of Great Britain and Ireland. Unfortunately the recurrence of the disease in both Ireland and England caused the cancellation on June 24, 1912, of all permits and the ports are still closed. This outbreak began in Ireland, the first in twenty-nine years, and a number of centers in England became simultaneously infected by a consignment of Irish cattle affected with the disease. Up to the present time there is no definite information as to the origin of the disease in Ireland or how long it has been in existence there.

The recent report of the English departmental committee on foot-and-mouth disease is confessedly one of failure to devise means for preventing these repeated outbreaks. With the disease so prevalent in European countries and with so many conceivable possibilities of the infection being conveyed to unsuspected quarters, even districts most remote from the present known centers of infection cannot be considered free from danger of indirect contamination. It therefore behooves all veterinarians in this country to keep a keen lookout for this disease in America, and report any suspicious cases, for it is better to have a hundred false alarms than to let one genuine case remain unreported. It has been stated that the present outbreak in England was due to failure of an unqualified practitioner to recognize the symptoms of foot-and-mouth disease on a farm in Ireland before cattle were shipped from there to Liverpool. On the day the cattle were driven away he was treating six other cows for what he

termed "timber tongue," and the subsequent disposal of the exposed animals has resulted in the most alarming visitation of foot-and-mouth disease England has experienced for many years. The remarkable fact that the disease may crop out in an otherwise healthy country without any apparent cause has been observed very frequently. It should be remembered that the virus of this disease is more readily transmissible than the virus of any other disease; it adheres to clothing and other articles and may also be conveyed indirectly by a person coming in contact with another who has been among infected animals. With such possibilities present, the greatest danger which seems to exist in this country is from immigrants or others who leave infected farms in Europe, carrying the infectious principle on their shoes, gloves or clothing, to the cattle on farms in this country where they obtain employment. The virus is known to have a vitality of about eighteen days outside the body, and in sealed glass tubes its infectivity remains for three to four months, so it is easy to understand how it may be carried on clothing for considerable distances before it becomes inert.

DOURINE.

The reappearance of this disease in the United States was brought to the attention of the bureau by State Veterinarian Gibson in May, 1911, when members of the bureau confirmed its existence in Iowa by clinical and microscopic examinations. All the affected and exposed animals were either killed or quarantined but not before several exposed animals had been shipped to Texas, Arkansas and North Dakota to which states they were readily traced and disposed of according to the conditions found. Two exposed stallions were taken to Canada before the disease was recognized and these animals also were killed. Extensive examinations of all cases which had been bred to infected animals were carefully made and the results indicated a comparatively limited dissemination of the infection.

The chronic character of the disease and the fact that affected animals may show no indications of the infection for a long period makes its diagnosis very difficult; consequently suspected animals must be placed under a prolonged quarantine.

Following the success in diagnosing various infectious diseases by the complement fixation test, the possibility of the appli-

cation of this method for the diagnosis of dourine has been carefully considered by the bureau. The numerous attempts which were first undertaken were not successful due to the difficulty of obtaining a satisfactory antigen for the test. The blood, organ extracts, bone marrow, etc., of affected animals were utilized for the preparation of antigen but without uniform satisfaction. While still working with these various antigens the results of the investigations of Winkler became known. His studies showed the possibility of utilizing an antigen from another trypanosomiasis than dourine, nagana in this instance, thus indicating that the complement fixation in trypanosome affections represents a group reaction. Knowing the great abundance of trypanosomes in experimental rats affected with surra a culture of trypanosoma Evansi was obtained through the courtesy of Professor Novy, of the University of Michigan, and injected into a number of white rats. After four or five days when the disease was at its height the rats were bled to death, and as an antigen a shake extract was prepared from the blood and the macerated spleen. The preliminary tests with this antigen were very encouraging as the sera of the dourine horses at the Bethesda Experiment Station, and also the sera of surra rabbits during both the febrile and afebrile periods gave in all instances excellent fixation.

The smallest quantity of dourine serum which gave a positive reaction proved to be 0.05 cc.; the positive tests showed that even a fixation in 0.2 cc. of serum is sufficient for diagnostic purposes. Sera from normal animals, also those affected with various other diseases, failed to give a reaction. Incidentally it may be mentioned that the sera from three swamp fever horses were tested with negative results, thus further proving that the cause of this disease is not a trypanosome. The antigen was used in dilutions of one to ten, and retained its effectiveness for three months after its preparation. The ease with which an affirmative diagnosis of dourine may be obtained with this test is not to be compared with the arduous task which is necessary to determine the presence of the causative trypanosomes microscopically.

The possibility of utilizing the complement fixation test for the diagnosis of dourine is of great moment in the control of the disease. By this means it is possible to determine all infected animals within a short time, and dispose of them by methods best suited for the control of the infection. Furthermore, the introduction of the disease into any country could also be guarded

against by a compulsory requirement of this test on all horses imported from countries in which dourine is present.

Since these lines were written the value of this method of diagnosis for dourine has been well illustrated. Early in July Dr. Knowles, state veterinarian of Montana, wrote the bureau to the effect that there were several suspicious cases of dourine in eastern Montana and requested that an expert be detailed to make a diagnosis. Owing to the impossibility of complying with this request a telegram was forwarded asking for blood sera from the suspected animals. This arrived on the twenty-second of July in excellent condition, and on the following day the complement fixation test showed that four of the five samples gave a positive reaction. Thus another center of dourine has made its appearance in the United States, but at this time it is impossible to state whether the disease was imported or originated from one of the previous outbreaks in this country.

Dourine was reported in Brazil for the first time this year in an article on "A trypanosomiasis of horses known as 'Mofo'" by Dr. Saboria. He identified the two diseases as being the same and encountered the trypanosoma equiperdum for the first time in South America, publishing his report in the Brazil Medico, January 8, 1912. The disease has existed as an epizootic for many years in Ceara where it spread with more or less intensity. Its origin is unknown but it is surmised that it was disseminated by Arabian horses imported in 1864 or by Andalusian mares which are very sensitive to the disease.

INFECTIOUS ABORTION.

In reviewing the veterinary field covered during the last few months the particular event which indicates marked progress in the study of animal diseases is the work on infectious abortion that is being conducted in this and other countries.

From the viewpoint of economic importance, infectious abortion of cattle ranks second only to tuberculosis, and in certain sections of the country even supersedes the latter in the monetary loss it occasions. Aside from the loss of the calf, the loss occasioned by the reduction in milk supply together with the failure to conceive for several months or forever after the abortion, and the frequency of retained placenta has made this disease the bane of dairymen and stock raisers.

The exact financial loss cannot be even approximately estimated but from the fact that the disease exists in all sections of the country both in dairy and in range cattle, as is evidenced by the reports from various state officials and from the inquiries received at the bureau regarding this disease, it can safely be stated that the direct loss reaches into the millions while the potential loss is likewise enormous and inestimable. Furthermore, the disease may be brought into a herd by an unsuspected animal and may spread rapidly to other individuals without attracting attention, inasmuch as there are no readily noted symptoms present in the diseased animals.

While the bureau has for several years concerned itself with the general problem of infectious abortion in cattle, a few important phases have been more extensively studied during the past year and even though many of the problems remain unsolved and some experiments are as yet not finished, still some valuable data have been obtained. Probably the most important and comprehensive facts which have been demonstrated in connection with this disease are the discovery that the abortion bacillus is eliminated with the milk of the infected cow and secondly that this bacillus is found in the tonsils of children presumably as a result of drinking such infected milk. At our last meeting in Toronto, Schroeder and Cotton presented a paper on a bacillus which they obtained from milk and which was capable of producing tubercular-like lesions in guinea pigs. The name of Bacillus 637 was given to the organism as the first cow secreting such contaminated milk was No. 637. A comparison of this organism with bacillus abortus demonstrated conclusively that they were identical. Not only was this proof obtained by a study of morphology, biologic characteristics and pathogenicity, but the identity of the organisms was further established by the complement fixation test on serum from animals affected naturally and artificially with infectious abortion in which both the 637 and abortion bacilli were used separately as antigens. The frequency of the presence of bacillus abortus in a food product like milk and the ability of the organisms to produce lesions in guinea pigs, pregnant cows and other animals, led at once to the thought that bacillus abortus might prove pathogenic for human beings, and as a result our endeavors were directed along three lines; one was to obtain sera promiscuously from human beings and in case of positive reaction, to learn more about the

history of the individual whose serum showed the reaction, the second was to obtain samples of milk from women in order to examine for the abortion bacillus, and third to obtain tonsils from milk consuming children at the various children's hospitals and inoculate such material into guinea pigs. Material for these lines of work was not forthcoming as fast as desired. Out of twenty-five serums from human beings, no positive results were obtained by either the complement fixation or agglutination tests, although in similar tests made by Larson, three out of one hundred specimens of sera gave positive results. No samples of human milk have thus far been obtained. Out of twenty-eight tonsils and adenoids inoculated into guinea pigs, tonsil No. 3 produced necrotic areas in the liver, but cultures from this organ remained sterile. Tonsils from case No. 8, inoculated into two pigs showed in one of them, after three months, distinct lesions of bacillus abortus infection in the liver, spleen and testicle and bacillus abortus was obtained from the lesions.

The pathogenicity of this organism for white mice, white rats, chickens, kittens and dogs was sought for with varying results. Some strains would kill white mice with septicemia within forty-eight hours when others failed to do so but would produce necrotic areas in the liver and spleen within two and one-half months, while still others would fail to produce any lesions at all in these animals. The difference in pathogenicity was not alone noticed in different strains of bacillus abortus in these and other animals, but also in the same strain but of a different generation, the organism losing its pathogenicity with life on artificial media. Kittens and dogs are still under observations, the first batch of kittens used, dying within three weeks with enlarged and hemorrhagic spleens and waxy livers, but in these cases the organism has not as yet been recovered. Chickens have only in one instance shown small necrotic foci and petechial spots in the liver as a result of feeding cultures of bacillus abortus.

Continued efforts were directed towards obtaining a biologic product which would prevent abortion in already pregnant animals and also in animals to be bred soon. Observations up to date do not warrant the making of any definite conclusions. Over one hundred and fifty head of cattle have been thus treated three or four times and only a very small portion of this number have as yet calved. In a small herd treated early in this work the results were not encouraging but failure in those cases may be

attributed to the facts that a very thin suspension of bacterin had been injected and secondly, just one strain had been used in the preparation of the bacterins. Since the different strains have been found to vary somewhat, subsequent experiments have been conducted with denser suspensions made from a number of our most virulent strains, and the preliminary results thus far obtained with these injected cattle have been more satisfactory. For a more definite decision on the value of this line of vaccination the results of the treatment of the latter animals must be awaited. Besides the above work the diagnosis of the disease by the complement fixation and agglutination tests has been successfully carried out on over two hundred cases with satisfactory results. Studies are also being conducted with reference to the immunizing effect which infected milk from a "bacillus carrier" mother will have upon the calf when it becomes adult.

GLANDERS.

The determination of occult and latent cases of glanders in horses and the necessity of an early diagnosis in these animals are of great importance, and therefore, experiments have been conducted on an extensive scale in many laboratories in order to determine the most reliable method by which such cases may be diagnosed. Following the splendid results which were obtained in Germany by the combined complement fixation and agglutination tests for the diagnosis of glanders, this method has been adopted by many laboratory workers and has proved very satisfactory. Samples of sera have been forwarded for diagnosis to the bureau laboratory from all over the United States and they have become so numerous that it has become necessary to place restrictions on the work. It is regrettable that we do not always receive the post mortem findings in cases which are diagnosed as positive by this method, but judging from the instances in which the autopsy findings have been reported the combined tests appear to be accurate in over ninety-eight per cent of the cases. In all more than 3,200 animals have been tested by this method, and the bureau is encouraging the state, as well as the municipal authorities, to adopt this method of diagnosis which at the present time is undoubtedly the most accurate laboratory test at our command for the determination of the disease.

Such tests, of course, will always continue to be strictly con-

fined to well equipped laboratories, and therefore, it is desirable to establish a method of diagnosis for glanders which could be undertaken by the practicing veterinarian and which at the same time would be more accurate than the subcutaneous mallein test.

The preliminary work with "mallease" a form of precipitation test, led to the hope that this method would be of advantage to the practitioner, but our later tests have shown that the results are not uniform and therefore not dependable.

The favorable reports of results obtained from the ophthalmic reaction in the diagnosis of glanders in Europe suggested the application of this test in order to determine its accuracy. This method is followed extensively in Austria and constitutes the official test of that country. The European investigators suggested for use in these tests either the mallein brute, which is a concentrated form of the ordinary mallein or a five per cent watery suspension of the alcoholic precipitate of this product. In the work of the bureau the mallein has been prepared by concentrating the mallein used for the subcutaneous tests to one-tenth of its original volume without the addition of glycerine or carbolic acid. The application of the mallein into the eye is made with the aid of a camel's hair brush. After sterilizing the brush, it is dipped into the mallein, the eye being opened in a manner as practiced in the examination of the conjunctiva, and the brush is drawn once forward and backward over the eye. The application is made into one eye only, while the other is used as a check. In the presence of any inflammatory conditions in the eye, the test should not be undertaken. Twenty hours subsequent to the application of the mallein to the eye the reaction is read. The presence of a purulent discharge together with the conjunctivitis indicates the presence of the disease.

In most instances the reaction is very prominent and may be recognized at a glance.

The results obtained by this test have proved very encouraging and highly satisfactory. In all positive cases the reaction was very pronounced and the presence of the disease confirmed by autopsies, while negative cases controlled by the agglutination-fixation test showed no reaction whatsoever. The test in our hands has been found to be superior to the subcutaneous mallein test, and has besides, the advantage that after the application of

the mallein into the eye, it is only necessary to examine the animals about twenty hours subsequent to the administration.

In an article by Dedjulin appearing in last May's number of Zeitschrift fur Infektionskrankheiten a table of comparative results is given from the application of different diagnostic tests to two hundred and forty-five healthy horses. Following the subcutaneous injection of mallein, five of these normal horses gave positive reactions, ten gave doubtful reactions and two hundred and thirty negative reactions. By applying the mallein to the eye, not a single animal gave a positive reaction, two gave questionable reactions and two hundred and forty-three were negative. By the complement fixation test of Bordet and Gengou, all the cases gave negative results, while this test as modified by Shutz and Schubert, resulted in one positive reaction, thirteen indistinct readings and two hundred and thirty-one negative reactions.

TUBERCULOSIS AND HOG CHOLERA.

The two very important diseases, tuberculosis and hog cholera, will not be discussed at this time, inasmuch as the principal facts about the former have been recently brought to the attention of our members through the reports of the International Commission on the Control of Bovine Tuberculosis, while the latter disease has this year been made the subject of a symposium before the section on Sanitary Science and Police. However a few remarks will be made upon the methods of applying the tuberculin tests which have received considerable attention during the past year. Either of these methods simplifies the testing of cattle for tuberculosis very materially and the establishment of their reliability and the perfection of means for applying them are therefore very desirable. Considerable attention has been given to the preparation of suitable tuberculin for this work. The tuberculin commonly furnished for subcutaneous testing is not concentrated enough, and attempts have been made to obtain a more active preparation, yet one which does not contain irritating properties.

Very encouraging results have been obtained from the use of tuberculin especially prepared for these methods, in tests that have been made at some of the larger packing centers. Correct readings have been obtained in percentages varying from eighty-

seven to one hundred. All results, both positive and negative in these tests were compared with the post-mortem findings by the slaughter of the animals.

In several instances the ophthalmic test has been used very satisfactorily in obtaining a decisive determination in cases that have given suspicious readings to the subcutaneous test.

The intradermal test has received the official sanction of certain state authorities, but added tests of its reliability are desired by other officials before recommending its use.

It appears that those who are not in favor of the subcutaneous test are divided as to the merits of the ophthalmic and interdermal tests, those approving the interdermal test condemning the ophthalmic test and vice versa. In order to formulate definite conclusions regarding these tests it would be advisable for those applying them to make careful notes of the results obtained, supported by post-mortem findings, and publish the records with the technic employed and the kind of tuberculin used, in our veterinary journals. In my own experiments the contrast between the results of the various methods of applying tuberculin has not been nearly as marked as the contrast between the subcutaneous and ophthalmic mallein test. Why mallein gives such a decided ophthalmic reaction may be explained by the fact that it contains a product which even when injected subcutaneously produces a local reaction in typical cases of a character entirely absent with tuberculin and when mallein is applied to the eye this local reaction is naturally expected to be more marked than in the case of tuberculin. This subject will be referred to later in this report.

MALTA FEVER.

By the recent investigations of Gentry and Ferenbaugh of the medical corps, United States army, the existence of Malta fever in Texas has been definitely established. Its occurrence in human beings has been demonstrated bacteriologically among certain families in the goat-raising sections of Texas, and since goats have been incriminated as carriers of the infection to man, the sera of a number of these animals in the infected localities were subjected to the agglutination test with positive results. The isolation of the *Micrococcus melitensis* from these goats was not successful, and the agglutination test was therefore, relied upon

for the diagnosis of Malta fever in these animals. The occurrence of the disease in Texas has been substantiated by Mohler and Eichhorn, who obtained positive results not only with the agglutination test but also with the complement fixation test of sera from goats sent to the laboratories at Washington from the infected localities of Texas and New Mexico.

The existence of this disease in Texas and New Mexico is of great moment, inasmuch as the general opinion has prevailed that the United States is free of Malta fever, and that the only occasions when the disease has appeared in this country were isolated instances, occurring through importation. However, from a careful investigation in the infected districts it seems evident that Malta fever, which is also known locally as mountain fever and slow typhoid fever, has existed in Texas and New Mexico for at least twenty-five years; that the disease has always made its appearance among people connected with goat-raising; that entire families have been taken sick with the disease on goat ranches; that many of the goat ranches have had one or more cases of the fever among the people connected with them; that some years there are numerous cases of the disease while other years only a few cases will appear. The affection appears usually after the kidding season, during the months of April, May and June, when the people are in closer contact with the goats. It is stated that the Mexican goat herders are quite infrequently affected but this may be due not to any natural immunity, but to the fact that the Mexicans always boil the milk before drinking it while the Americans use the milk raw. The origin of the disease in that section is indefinite, but it is claimed that the affection prevailed in Texas when the common goat was the only goat in the country and long before any of the fancy breeds of goats were imported from South Africa where Malta fever has been found to exist.

No thorough investigations have yet been undertaken as to the extent of Malta fever among the goats of Texas, New Mexico, and possibly in other states, and until this is determined it is impossible to decide upon a definite line of procedure for the control and eradication of the disease.

Although the disease has no active effect on goats, its eradication must be considered from the standpoint of public health, and in this respect it is of the highest importance, since there is a

tendency at the present time among physicians to advise the drinking of goat's milk for children and invalids.

TETANUS.

With the discovery of the cause of tetanus by Nicolaier in 1884 and the successful experiments on immunization by Kitasato and von Behring in 1890, a wonderful advance was made in our knowledge of the disease. This fundamental information enabled investigators to apply themselves to a line of study which resulted in the comprehensive knowledge now at our command concerning the pathogenesis of the affection. The practicing veterinarian has no longer to fear the development of this dreaded disease subsequent to operative or traumatic wounds as he is assured protection for his patients by the injection of a preventive dose of tetanus antitoxin. It is regrettable, however, that this method of prophylaxis which today is probably the most certain in preventive medicine is not used to a more general extent, especially in localities where the disease is very prevalent.

In a series of experiments on horses recently undertaken by the bureau of animal industry it was aimed to establish the smallest quantity of antitoxin, that is the minimum number of units, which would protect a horse against a positive infection of tetanus. The preliminary experiments were carried out on guinea pigs, and after establishing the best procedure of introducing the infection into the system experiments were undertaken on horses. The animals were infected with the pure cultures of tetanus spores and bacilli from which the toxins were eliminated by either washing the cultures or by heating to seventy-five degrees centigrade for forty-five minutes. In infecting the horses the natural modes of infection were followed as closely as possible. Thus the virus was introduced in artificially punctured wounds of the foot, into bruised, lacerated, traumatic wounds of the body, into the scrotum, etc. In all instances a small quantity of sterilized dirt was mixed with the culture which was found in the preliminary experiments on guinea pigs to be essential in producing a positive fatal infection. After infecting the horses, each animal after varying lengths of time received subcutaneous injections of antitoxin in varying quantities.

The results showed that five hundred units of tetanus antitoxin injected even ninety-six hours subsequent to the infection will

protect an animal against the disease. In no instance did any signs of tetanus develop in the animals after receiving over four hundred units of antitoxin, while the animal used for a check and those receiving very small quantities of antitoxin succumbed to the artificial infection. Symptoms of localized tetanus developed in the horses which received two hundred and fifty and four hundred units but even these animals recovered.

In consideration of the fact that all the horses used in these tests were quite aged and accordingly not nearly so susceptible as young animals, a somewhat larger amount of antitoxin would be necessary to prevent absolutely the development of tetanus in the latter animals. Accordingly five hundred units would seem to be sufficient for the prevention of tetanus in horses of any age. These results are of great interest when it is considered that the cost of the antitoxin for immunization can be greatly diminished by employing with safety only one-third of the quantity of antitoxin which is now being used for protective purposes.

In these experiments it will be observed that the antitoxin was employed at different periods subsequent to the infection and the results obtained indicate that the administration of the antitoxin even ninety-six hours after the infection will prevent the development of the disease. This is of considerable practical importance inasmuch as frequently the veterinarian is called to attend to an injured animal only after a considerable time has elapsed following the injury.

Dr. A. P. Hitchens* who carried out similar experiments on horses failed to notice the development of any symptoms of the disease in the animals receiving more than one hundred units. While the neutralization of the developing toxin may take place from such small quantities of antitoxin if injected early enough after the infection, where the antitoxin is injected after a longer period than one day following the infection, it might not be entirely safe to use such a small dosage of antitoxin.

From the results of these two investigations it may, therefore, be concluded that five hundred American units is a sufficient dose of antitoxin for use as a prophylatic, even in cases where the infection has occurred four days prior to the injection of antitoxin.

*American Veterinary Review, Vol. XXXVII, p. 597.

CHRONIC BACTERIAL DYSENTERY.

Owing to the fact that the disease known as chronic bacterial dysentery or Johne's Disease is probably more widely distributed in this country than has been generally recognized, and because of its great economic importance, it is deemed advisable to present a short review of the affection in the light of recent investigations.

Because of the insidious cause of this disease its nature is not apparent until a large portion of the intestinal wall has become grossly infected with the causative microörganism, thereby rendering its detection impossible at a period when it might yield to treatment. The symptoms are noticeable only after several months, sometimes even twelve months, following infection, depending on the age, vitality and environment of the animal. However, before any clinical symptoms are apparent a microscopic examination of the feces, or scrapings from the mucous membrane of the rectum will usually reveal large numbers of the acid fast causative agent in affected cases.

The disease is characterized by a progressive anemia and emaciation usually accompanied by diarrhea of an intermittent character. Each succeeding attack of diarrhea occupies a longer period than the preceding, causes the animal to grow gradually weaker and does not seem amenable to any form of drug treatment.

The lesions found on post-mortem examination are confined to the intestines, and the mesenteric lymph glands and their vessels. The mucous membrane of the affected areas is very much thickened and thrown into folds or corrugations which frequently show a narrow line of congestion on their summit. The mesenteric lymph glands are enlarged and edematous but show no caseation.

Although the lesions of chronic bacterial dysentery were described by Hansen and Neilson in 1881 it remained for Johné and Frothingham in 1895 to discover the causal organism. This was shown to be an acid-alcohol-fast bacillus indistinguishable microscopically from the tubercle bacillus.

In affected animals the bacilli are found in enormous numbers in the intestinal mucous membrane and in the mesenteric lymph glands and their ducts. A characteristic of diagnostic importance is the tendency of these organisms to form in groups or

clumps both at the seat of infection and in the feces or other material in which they may be placed.

Many attempts have been made to cultivate the bacillus on the various artificial culture media in general bacteriologic use, and on especially devised media, but apparently without definite success until recently Twort and Ingram have succeeded by incorporating in ordinary culture media having a distinct alkaline reaction, the dried and powdered growth of certain acid fast organisms which have been previously killed, or an extract of these organisms may be substituted. The timothy grass bacillus has been found most suitable to incorporate in the medium and to a lesser degree the smegma bacillus and the human type of tubercle bacillus. Several strains of bovine tubercle bacilli so far tested have failed to stimulate a growth.

Chronic bacterial dysentery chiefly affects cattle, but has also been reported in sheep and deer. The isolated bacilli produce no lesions in mice, rats, guinea pigs, rabbits, pigeons or chickens if given by mouth or inoculated into a vein, into the peritoneal cavity, or subcutaneously.

According to Olof Bang, affected cattle will react to a tuberculin made of avian tubercle bacilli while Twort and Ingram claim that animals suffering from chronic bacterial dysentery give no definite reaction to diagnostic products prepared from cultures of the timothy grass bacillus, avian tubercle bacillus, or Johne's bacillus; however, it is stated that the failure in the last instance may be due to the difficulty in securing a luxurious growth in fluid media. This difficulty may be overcome as the organism becomes accustomed to artificial media with the result that a more concentrated product may be secured.

Chronic bacterial dysentery may be differentiated from tuberculosis of the bowels by the absence of a reaction to tuberculin, the intermittent character of the diarrhea, the presence in the feces of a large number of acid fast rods arranged in clumps, the absence of a cough, the characteristic corrugated condition of the mucous membrane of the affected portion of the intestine, the thickening of the lymphatic ducts and the absence of ulceration in the intestine.

CANCER RESEARCH.

The occurrence of malignant tumors in domestic animals is comparatively rare, although owing to the vast number of animals

slaughtered in a given time in some of the larger abattoirs in this country such growths may appear at first thought to be rather common.

The veterinary inspectors of the bureau of animal industry occasionally find animals affected with cancers during their inspection of meats at the abattoirs having federal inspection. This does not occur with sufficient frequency to indicate that these tumors are ever likely to exact any serious toll from our meat producing animals, but it does occur often enough to stimulate interest in the relationship of the tumors of the various species of domestic animals, and leads to continued investigation of the transmissibility of tumors from animal to animal, and from an individual of one species to one of another kind.

This latter proposition is one that as yet is impossible of fulfillment, but transmission from animal to animal or from bird to bird of the same species may at the present time be accomplished under favorable conditions.

In the human family the increase in cancerous developments is very marked and has become a matter of deep concern to the health boards of several countries. In the United States at present it is stated that one death in every eight among human females, thirty-five years or more of age, is caused by cancer and one in every fifteen in human males of similar age.

The cultivation of malignant tumors in cultures outside the body of their natural hosts has of late received considerable attention and has been accomplished in a number of instances. Even in the successful cases however, the influence of the species is strongly manifested, for satisfactory growths of cancer cells can only be obtained by planting the seed cells upon plasma from the blood of an animal of the same species as that of the animal upon which the tumor originally developed. For instance, to grow cancer cells coming from a tumor upon a dog, the medium in which they are planted must be plasma from the blood of a dog. To propagate successfully, a cancer from a chicken, plasma from a chicken is necessary; while the growth of human cancer is wholly dependent upon a supply of human plasma to feed upon.

The most persistent argument over cancer has been with reference to the question of a parasitic origin of the disease. Many vegetable and animal parasites have been claimed as the cause by various workers but there has been no uniformity in the different parasites incriminated, and the cause of cancer has continued

to elude the search of hundreds of careful scientists. Just as the germ theory was all but discarded an interesting discovery was made by Erwin Smith, plant pathologist in the department of agriculture, who proved that tumors in plants, whether primary or metastatic, were caused by a microörganism, *bacillus tumefor*, which has been cultivated in pure cultures and with which these plant tumors may be reproduced at will. The many difficulties which were encountered and overcome in determining the cause of this plant disease should at least interest students of animal tumors to reconsider the possibility of their parasitic origin.

In conclusion your Chairman wishes to refer briefly to the proposed amendment to the By-Laws which was referred last year to the Executive Committee for action at this meeting, and which has for its purpose the abolition of the Committee on Diseases. In looking over the reports of the previous committees on diseases there seems to have been more or less doubt in the Chairman's minds relative to the purpose of this Committee. Despite this feeling a report from this Committee has been forthcoming almost every year, and has formed a very material portion of the work of each convention. During the last eight years this Committee has presented to the Association reports which have included thirty-seven individual contributions, many of which represented original research and some of which would certainly not have been presented to our Association in any other manner. It was this Committee that gave a symposium on the subject of tuberculosis at Philadelphia in 1908, and at Chicago in 1909 rabies was similarly treated, while in San Francisco in 1910 tuberculosis was again the subject of the symposium. Further it should not be forgotten that in 1909 this Committee recommended that a special committee be appointed to recommend the most effective and feasible methods for the control of bovine tuberculosis and to report at the next meeting. The Association at the suggestion of Dr. J. G. Rutherford did much more than this and by resolution authorized the creation of an International Commission on Tuberculosis to consider this important subject. If the Committee on Diseases does nothing more, this one suggestion should be sufficient to continue its name on the list of permanent committees of this Association. Unquestionably this Committee may be used to perform important functions, and the difficulty so frequently complained of is not so much in the existence of

the Committee on Diseases as it is in the stupendous and impossible task demanded of the Committee by the existing By-Law. Your Chairman therefore wishes to recommend that section 3, Article VII of the By-Laws be amended to read somewhat as follows:

"It shall be the duty of the Committee on Diseases to report at each meeting upon any disease or diseases which are believed to be of especial interest or sanitary significance to the members of this Association."

Owing to the great interest which has been manifested in the manner of applying tuberculin in the diagnosis of tuberculosis and of mallein in the test for glanders, it is respectfully recommended that a resolution be passed by this Association to the effect that the newly appointed Committee on Diseases, in case it is decided to continue this Committee, shall give special attention to an investigation of the relative value of the various methods of diagnosis of tuberculosis and glanders from the standpoint of the practitioner as well as the laboratory worker, and that it shall make its report at the next meeting. By outlining in this manner some special line of endeavor for the Committee on Diseases to perform each year much of the uncertainty which is now connected with what form the report should take will be dispensed with, and at the same time it will be possible to report on any new or interesting additional subjects that may present themselves during the year.

REPORT OF THE COMMITTEE ON INTELLIGENCE AND EDUCATION.

GEO. H. GLOVER, *Chairman.*

A. T. KINSLEY, E. A. A. GRANGE,

O. L. BOOR, F. S. SCHOENLEBER.

Mr. President, and Members of the American Veterinary Medical Association:

The report of your Committee on Intelligence and Education comprises the following individual contributions* and (D) a general report by the Chairman:

(A) "Clinical Instruction," by A. T. Kinsley, Kansas City, Mo.

*For individual contributions, see Papers and Discussions.

(B) "The Preparation of Students for Official Veterinary Examinations," by E. A. Grange, Toronto, Canada.

(C) "Neglected Features in Most Courses as Now Offered," by K. W. Stouder, Manhattan, Kansas.

General Report (D).

In the absence of Dr. F. S. Schoenleber, who is sojourning in Europe, the writer accepted the Chairmanship of the Committee on Intelligence and Education, late in the month of June, and too late to gather sufficient data to make such a report as the importance of this Committee warrants.

In presenting the report in this form I feel that an apology is due the Association, for while we may in this instance be excused on the plea of lack of time, it would seem that a committee report should properly be what its title implies,—a *report prepared, or at least sanctioned by all its members.* The Committee on Intelligence and Education, judging from its title, is unhampered in its scope by limitations within the confines of the veterinary profession. Its reports, while general, should be broad and comprehensive resumes of things patent to the profession as a whole, at the same time remembering that detailed reports are expected of special committees and in this instance, at least, covering several important phases of veterinary intelligence and education. The special committee appointed one year ago to investigate the veterinary colleges, relieves us of much labor and responsibility at this time.

The reports of the resident secretaries have been so tardy in reaching the Chairman of this Committee as to be of very little value in supplying much needed information; I wish to suggest to this Association, and more especially to the Committee on Resolutions, that these reports might have a far greater informational and educational value if specific instruction were given by this Association through its Secretary, as to what the cardinal features in a resident secretary's report should be and, furthermore, that these reports should be in the hands of the Chairman of the Committee on Intelligence and Education by the first of July of each year. The present arrangement fails in its object to furnish information for this report.

The status of veterinary education throughout the United States and Canada, while not altogether satisfactory, shows many

substantial improvements. A few expensive buildings have been erected, more are contemplated in the near future, and the increased facilities for laboratory instruction, and better equipment, indicate progress in that we are getting away from old time didactic methods.

Some tabulated statistics found in 1911 report of the United States bureau of education, seem worthy of being incorporated into this report. (See table page 118.)

As to the distribution of veterinary colleges in the United States, it is interesting to note that in 1910 in the South Atlantic and South Central division of states, there were but three veterinary colleges and two hundred and fifteen students, while in the Northern and Western states there were seventeen veterinary colleges and two thousand five hundred and two students enrolled, making a total of twenty colleges and two thousand seven hundred and seventeen students, this is an increase of only forty over the year previous, but it should be remembered that in 1908 there were five hundred and forty-seven more than in the year previous and in 1909 an increase of four hundred and thirty-eight over the number in 1908. There were five hundred and ten men graduated in 1908; seven hundred and sixty-nine in 1910 and seven hundred and sixty-three in 1912 in the United States.

The following tabulated information, gathered by correspondence during the last month, shows among other things, that all the colleges except four are conferring the degree (D. V. M.), as recommended by this Association at the Toronto meeting:

Name.	Condition of Matriculation.	Degree.	Length of Course	Graduated in 1912
Terre Haute Vet. Col	‡2nd gr. Civ. Serv. Ex.	D. V. M.	3 yrs.	27
Grand Rapids Vet. Col	‡2nd gr. Civ. Serv. Ex.	D. V. M.	3 yrs.	37
Kansas City Vet. Col	‡2nd gr. Civ. Serv. Ex.	D. V. M.	3 yrs.	130
St. Joseph Vet. Col	‡2nd gr. Civ. Serv. Ex.	D. V. M.	3 yrs.	18
McKillip Vet. Col	‡2nd gr. Civ. Serv. Ex.	D. V. M.	3 yrs.	60
Chicago Vet. Col	‡2nd gr. Civ. Serv. Ex.	D. V. M.	3 yrs.	122
Cincinnati Vet. Col	‡2nd gr. Civ. Serv. Ex.	D. V. M.	3 yrs.	38
San Francisco Vet. Col	‡2nd gr. Civ. Serv. Ex.	D. V. M.	3 yrs.	30
Univ. of Penn. Vet. Col	‡2nd gr. Civ. Serv. Ex.	V. M. D.	3 yrs.	58
George Washington Univ. Vet. Dept.	‡2nd gr. Civ. Serv. Ex.	D. V. M.	4 yrs.	18
Indiana Vet. Col	‡2nd gr. Civ. Serv. Ex.	D. V. M.	3 yrs.	51
Kansas Agr'l Col., Vet. Dept	8 Unit Credits	D. V. M.	4 yrs.	38
N. Y. American Vet. Col	Regents' Exam	D. V. S.	3 yrs.	8
N. Y. State Vet. Col	Regents' Exam	D. V. M.	3 & 4 yrs.	29
Wash. State Col., Vet. Dept	2 & 4 yr. H. S	D. V. S.	3 & 4 yrs.	9
Colorado Agr. Col., Vet. Div	H. S. Diploma	D. V. M.	3 yrs.	12
Iowa State Col., Vet. Div	H. S. Diploma	D. V. M.	4 yrs.	25
Alabama Polytec. Inst., Vet. Dept.	12½ Credits	D. V. M.	3 yrs.	11
Ohio State Univ., Vet. Dept	8 Unit Credits	D. V. M.	3 yrs.	47
Ontario Vet. Col	Examination	B. V. S. & D. V. S.	3 & 4 yrs.	79
*Michigan Agr. Col., Vet. Div	Accredited High Sch'l	D. V. M.	4 yrs.	0
			Total	842

‡ According to B. A. I. Circular 150.
* Organized 1910.

Statistics of schools of veterinary medicine for the year 1909-10.

	Location.	Name of institution.	Year of first opening.	Dean.	Students. Men.	Women.	Having College Degree.	Graduated in 1910.	Instructors.	Years in course.	Tuition fees.	Volumes in library.	Value of scientific apparatus, etc.	Value of grounds and buildings.	Income from fees.	Total income, including benefactions.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Auburn, Ala.	Alabama Polytechnic Institute, School of Veterinary Medicine.	....	C. A. Cary	53	....	0	8	16	3	0	....	$5,000	$11,000	....	....
2	San Francisco, Cal.	San Francisco Veterinary College.	1899	Charles Keane	66	....	0	14	15	3	a$150	0	5,000	0	$8,250	$10,250
3	Fort Collins, Colo.	Colorado Agricultural College, Division of Veterinary Science.	1907	Geo. H. Glover, M.S., prof.	46	0	2	19	a23	3	0	a1,000	4,581	....	....	16,390
4	Washington, D. C.	George Washington University, College of Veterinary Medicine.	1908	David E. Buckingham	50	....	2	0	18	3	100	....	10,000	....	5,000	5,000
5	.......do	United States College of Veterinary Surgeons.	1894	C. Barnell Robinson	112	....	3	41	20	3	100	1,000	10,000	70,000	11,285	11,285
6	Chicago, Ill.	Chicago Veterinary College	1883	Austin H. Baker	437	....	....	137	19	3	100	2,050	20,425	100,000	44,250	44,250
7	.......do	McKillip Veterinary College	1892	Charles Frazier	230	....	....	95	23	3	100	....	35,000	120,000	23,000	23,000
8	Indianapolis, Ind.	Indiana Veterinary College	1892	George H. Roberts	179	....	....	50	17	3	90	....	8,750	60,000	16,030	38,754
9	Terre Haute, Ind.	Terre Haute Veterinary College	1909	S. V. Ramsey	37	....	0	0	15	3	90	....	8,000	0	3,000	3,000
10	Ames, Iowa	Iowa State College, Division of Veterinary Medicine.	1880	Charles H. Stange	110	....	1	17	7	4	a 30	....	3,400	....	1,194	....
11	Manhattan, Kan.	Kansas State Agricultural College, Veterinary Department.	....	F. S. Schoenleber, prof.	80	....	2	7	18	4	9	....	10,000	70,000	....	....
12	Grand Rapids, Mich.	Grand Rapids Veterinary College.	1897	A. Austin, sec.	128	....	0	41	15	3	95	....	10,000	24,000	....	11,878
13	Kansas City, Mo.	Kansas City Veterinary College.	1891	S. Stewart	493	....	7	152	24	3	100	457	20,000	175,000	47,000	....
14	St. Joseph, Mo.	St. Joseph Veterinary College*	....	C. E. Steel	54	....	....	21	12	....	85	....	....	....	....	....
15	Ithaca, N. Y.	New York State Veterinary College at Cornell University.	1896	Veranus Alva Moore	100	1	1	22	16	3	0	3,603	44,182	141,797	....	48,580
16	New York, N. Y.	New York-American Veterinary College, New York University.	1899	William J. Coates	12	....	0	5	20	3	115	1,325	1,500	0	1,250	1,250
17	Cincinnati, Ohio	Cincinnati Veterinary College	1900	Louis P. Cook	125	....	0	45	12	3	100	300	10,000	0	12,108	12,108
18	Columbus, Ohio	Ohio State University, College of Veterinary Medicine.	1900	David Stuart White	205	0	2	47	17	3	0	....	19,000	150,000	....	....
19	Philadelphia, Pa.	University of Pennsylvania, Veterinary Department.	1884	Louis A. Klein	160	0	....	b87	29	3	120	....	....	....	....	....
20	Pullman, Wash.	Washington State College, Veterinary Department.	1897	S. B. Nelson	39	....	0	11	15	3, 4	0	800	25,000	40,000	....	....

* Statistics for 1908-9.

a Approximately.

b Number in third-year class.

In the matter of extending the course to twenty-four months (one year from this fall) there is a decided difference of opinion as to whether the course in each instance should be extended over four years or given in three years of eight months. The effect of lengthening the course of study and requiring high school credits for matriculation will no doubt decrease the total number of students in veterinary medicine for a time with the ultimate result that we shall have been advanced to a higher plane of usefulness and will command greater respect and confidence of a truly appreciative clientage.

The experiences of our medical *confreres* in this connection will no doubt be interesting and instructive and we should profit by their mistakes. In the year 1910 there were 128 medical schools, 21,394 students and 4,448 graduates in human medicine. During the six years previous to 1910 there was a decrease of 5,555 students, and in three years prior to 1910 there was a decrease in medical schools from 152 to 128. This marked decline in students and colleges was ascribed in the main to the enforcement of higher standards. The council on education of the American Medical Association, in 1910, declared, that "there are too many medical schools in the United States; that the work could be done more economically and more satisfactorily to both students and general public by one-half as many schools. But the difficulty lies in bringing this about. The weaker schools would naturally be expected to give way, but as they have lower standards, easier requirements for admission and graduation, lower fees, and if at the same time their graduates are able to pass the state examinations, many students will seek them rather than the schools with high standards and high fees." The examiner for the Carnegie Foundation reports on the status of the medical profession in no uncertain terms; "For twenty-five years there has been an enormous overproduction of uneducated and ill-trained medical practitioners. This has been in absolute disregard of the public welfare and without any serious thought of the interests of the public. Taking the United States as a whole, physicians are four or five times as numerous in proportion to population as in older countries like Germany." "The second significant fact revealed to the examiner is that overproduction of ill-trained men is due in the main to the existence of a very large number of commercial schools, sustained in many cases by advertising methods through which a mass of unprepared youth

is drawn out of industrial occupations into the study of medicine." "The third fact revealed is that until recently the conduct of a medical school was a profitable business, for the methods of instruction were mainly didactic." "As the need of laboratories has become more keenly felt the expense of an efficient medical school has been greatly increased."

I have brought to your attention the predicament of the medical profession by quoting from the best possible authorities. The veterinary profession is "on the self-same ladder only just a round below." We should see their proposition as possibly our own, in the near future, and it is to be hoped that we will have the prophetic vision that will actuate us to profit by their mistakes. I am creditably informed that there is serious opposition to the high standards of the American Medical Association and that talk of organizing another association, where conditions are easier, is rife. Assuming the statement of the examiner to be true, that there is, "an enormous overproduction of uneducated and ill-trained physicians," the cry against the rigid requirements of the American Medical Association in order that the commercial schools may continue to open their doors and declare dividends, is unethical, unreasonable, and absurd in the extreme. In the realm of veterinary medicine we have not yet arrived at a condition of overproduction, but there is "the handwriting on the wall," and every step in the direction of higher standards helps to avert the portending disaster. The promptness with which several colleges have adopted the uniform degree and other "signs of the times" point to a certain, if not an altogether cheerful compliance with the matriculation and course requirements of this Association, when the time arrives for them to go into effect.

The question of distribution of the required twenty-four months of actual college work, is a vital one. The argument that seven months of persistent application, with fewer holidays, in some instances is equal to nine months in others, or that three years of more persistent application is in educational possibilities equal to the same number of months spread over four years, is irrelevant, incompetent and absurd. If the work can be given in short periods with equal returns, then why not crowd all the required hours into one college year? (*reductio ad absurdum.*) Mental growth with proper adjustment of all its faculties can not possibly be hurried to the maturity of years

by forcing the mental pabulum, any more than can a plant or animal be forced to physical maturity by supplying more food than can be assimilated. We do not become wise with the experiences of a day, but rather with the experiences of years. The nerve centers do not acquire the mastery of a musical instrument by one inspiration, neither does the brain acquire mental acumen by a few vivid experiences, but rather is by a gradual expansion and adjustment resulting from the aggregate experiences of many years. It is a well established principle in pedagogy that education can not be wisely and safely forced upon a normal individual. It probably would be the consensus of opinion among educators, with consideration of special conditions eliminated, that a course of four years of six months each year would be preferable to three years of nine months each year.

Dr. O. L. Boor, a member of the Committee on Intelligence and Education, was excused from presenting a thesis as part of this report, because of many duties in connection with the Association at this time. Doctor Boor, in a personal letter, has mentioned a subject that has been discussed at probably every one of our meetings and upon which we have never been able to formulate a definite plan for action. This subject may be looked upon as the paramount issue at this time, and I will present it by quoting from Doctor Boor's letter: "In reference to the reciprocal exchange of licenses; take a man that has been out of college twenty years and has a license in the state in which he has been in practice who desires to move to another state; not very many of these men can pass the present examinations, although they are good, sensible, hard-headed practitioners, and could do about anything required except pass a state board examination. Under the present circumstances this works a hardship on a good deserving veterinarian. Some of the states have provisions in their laws allowing reciprocal relations to be established, but the boards refuse to take advantage of the provisions, while other states have not this clause, but would take advantage of the same, if it were possible."

The reciprocal exchange of state licenses is desirable, but one state hesitates to extend this courtesy to another, even if her statutes permit, unless the same courtesy may be expected in return. The laws of several states are specific in this matter and if there is no way whereby the licenses of other states may be legally recognized, it would seem that our only recourse is to seek

legislation at the first possible moment. All the most desirable locations for practice will be sought in all the states; the equilibrium will be established by influx of new, if not old, graduates, so there should be no selfish reasons for any of the states fighting such amendments to existing state laws that would make reciprocity a reality. The desired amendments in each case, would consist of but one clause, and as it would be largely a matter of convenience, fraternity and reciprocity, there could be no reason for legislators refusing to pass such a bill if endorsed by local veterinary organizations. If we must take the longer route to reach the coveted goal, the sooner we start the better. Reciprocity that would include all licensed men should not be considered, for several states are licensing men to practice veterinary medicine as non-graduates. If legislation is asked for with the object of reciprocity, the enacting clause should be specific in offering no compromise to men not eligible to civil service examinations, or membership in the American Veterinary Medical Association. A federal license that would be good in any state would be ideal were such an arrangement possible.

Another member of your Committee has made a suggestion for this report in the following words: "Entrance examinations should not be controlled by the faculty of the college the student expects to enter, at least not the veterinary faculty." This statement is applicable only to such colleges as do not require high school or college diplomas, or regents' examinations for matriculation. This subject should be thoroughly discussed at this meeting and more especially the bearing that the 1914 matriculation requirement will have on the same.

For obvious reasons, several colleges have the wise provision that students entering upon their senior year shall have no back work, and shall carry only a certain number of hours of class work a week. The practice has become quite common, and it is as deplorable as it is unjust, for students finding themselves caught by this very commendable rule, to go to other colleges ranking the same under the bureau of animal industry classification, and receive their degree in one year. The incentive for such a move is strengthened by knowledge of the fact that in some cases their course is shortened six weeks. It certainly would be just and reasonable for a college faculty receiving such a student, to correspond with the institution from which he came, and require more than a mere list of credits.

Another member of your Committee offers the following suggestion for this report, which is apropos; "I think we should call attention to the fact, and it is a fact, that many of the colleges have instructors, who, while they have fine educations, have not the faculty of imparting it to students, and these schools will have men fail on an examination, when really it is not the fault of the student, but imperfect instruction, and the college puts out these men knowing that they have these imperfections in education; it necessarily follows that the remedy is more competent, better paid instructors, who can give their individual time to some of the branches that have been neglected."

I wish merely to suggest that while we are exacting so much from our students, possibly they have grounds for asking more from us. While major subjects are nominally taught by heads of departments, in some instances, they are in reality taught by young and less experienced men. In some of the state colleges one or more of the regular professors are connected with the United States experiment station and give an unwarranted amount of their time to investigational and extension work, with only casual supervision of class and laboratory instruction.

Before making this report, advice was sought from several prominent educators and practitioners. I only regret that my appointment as Chairman of this Committee came so late that much specific information could not be obtained. One writer, not a member of this Committee, has made the following suggestion: "I have been considering some matters which may be advantageous to veterinary colleges in the educations of their students, *especially in preparing them for examinations before outside boards of examiners,* be they individual state boards, provincial boards or even federal boards."

The preparing of students for examinations before outside boards is, no doubt, praiseworthy, in a way, but the question should be carefully considered as to whether it is a laudable practice to take time from the prescribed course of study especially to prepare students for such examinations. Should a college course be looked upon as "a platform to get in on, or to stand on?" Is the prime object of education the making of a life, or the making of a living? The studying of board examination questions and instructing students along the line of "probabilities" and "catch questions" is certainly not the highest ideal in veterinary education. Let us place our ideals high and not encour-

age students by precept or example, to think that the coveted goal is essentially a preparedness to successfully pass outside examinations, but rather that veterinary medicine is a real profession, based upon a very wide range of facts and sciences.

In this part of your Committee's report I have briefly made mention of a few seemingly important matters incident to veterinary education. These and many more, while not new, might profitably be discussed at this meeting. We have not, and we never shall, exhaust the subject of veterinary education, for in the ever changing drama of life we must constantly seek readjustments; we must every year expect to be confronted with these self-same problems, sometimes viewing them with more and at other times with less interest, but always seeing them from a different angle and we trust with a clearer vision.

The veterinary intelligence part of this report should properly include a more or less superficial review of what the veterinary profession as a whole is doing, and a cursory suggestion as to noteworthy achievements during the past twelve months. According to our By-Laws this Committee might appropriately collect information relative to veterinary sanitary work, recent veterinary facts, the splendid achievements of field and laboratory investigators, new methods in laboratory technic, and many more, each of which in its manifold subdivisions would furnish ample material for an instructive and interesting thesis. From lack of time, if for no other reason, we must be content with this brief statement, for I must not trespass upon the ground of the Committee on Disease, the Special Committee appointed to investigate the American Veterinary Colleges, and my co-committeemen. Veterinary science is not a distinctive science with well marked limitations, rather is it a group of correlated sciences, that in turn are similarly related, leading disconnectedly on over the boundless billows of human thought and experience, sounding the depths of human aspiration and touching every shore of human knowledge.

REPORTS OF RESIDENT SECRETARIES.

ARKANSAS.

J. F. Sanford, Fayetteville.

In compliance with my duties as Resident Secretary from the state of Arkansas for the American Veterinary Medical Asso-

ciation, I have the honor to submit the following report: Our department work consists mostly in tick eradication, also the manufacture and distribution of anti-hog cholera serum. Tick eradication work is progressing favorably: Thirteen counties are now above the national quarantine line with prospects of some three or four more and portions of at least five others being placed above the line early in the fall of the present year. Arkansas station hog cholera serum is giving satisfaction throughout the state.

Through the coöperation of the live stock growers we have been able to organize a state live stock growers association with branch district associations.

Arkansas now enjoys a live veterinary society with prospects of getting a veterinary practice law through our next general assembly. Failure during our last session occurred from lack of time of the members to give the bill consideration prior to adjournment.

General sanitary control work of this department is very favorable with prospects of a demand from the Arkansas live stock growers on the next general assembly for a larger appropriation to further extention along this line of effort.

COLORADO.

I. E. Newson, Fort Collins.

The veterinary profession in Colorado has made steady progress during the past year; the association has increased in members and interest in the meetings has been a cause for congratulation. Two resolutions passed at the annual meeting may be of interest to the profession in general. One condemned the manufacture of anti-hog cholera serum by laymen and the other was directed against the application of the tuberculin test by those not veterinarians.

Our practice law seems to be working satisfactorily, although there are non-licensed men still practicing, who should be prosecuted. Practitioners are awaiting, with considerable interest, a test of the Colorado law in the courts that its value may be known. Our board has promised to bring such a test case, and its conclusion will establish whether protection is afforded from uneducated and inefficient men or whether all our efforts in this direction have been in vain.

There have been over seventeen hundred stallions and jacks licensed under the state stallion law and up to this time the ques-

tion of the accuracy of the veterinarian's examination, has been questioned in only four cases. Owing to the fact that "spavin," "ring bone," "roaring," "specific ophthalmia" and "venereal disease" were specifically mentioned in the law, there arose a difference of opinion as to what was meant by these terms. For instance one practitioner contended that he could not pass a horse that had a bog spavin, while another maintained that the term spavin applied to bone spavin only. A committee of the state association has defined these terms and hereafter there should be no confusion.

The mayor of Denver is to be congratulated, in that, for the first time in its history a veterinarian has charge of the meat inspection department; also, we are pleased to record the fact that two graduate veterinarians are employed by the dairy inspection department. These are straws showing the direction of the wind and we trust that in time the people of our largest city will see the wisdom of having all of their dairy and meat food products under close veterinary inspection.

The veterinary division of the agricultural college is showing a healthy growth and keeping well abreast of the wave for higher standards of teaching and higher standards in students.

Probably our most serious disease at the present time is infectious anemia or swamp fever; large numbers of horses are lost annually and remedial agents seem to be of little value. The state experiment station has taken up the study of the problem, with as yet little practical results. There is a disease much resembling swamp fever, prevalent around Colorado Springs, which Dr. B. F. Kaupp seems to have proven a different malady; the cause is as yet unknown, but a certain plant is under suspicion.

Cattle and sheep scabies, once dreaded scourges in this state, are now nearly exterminated.

Judging from the number of dog heads sent to our state institutions for examination, rabies has not been as prevalent as formerly.

Dr. B. F. Kaupp of the experiment station has for some time been making a study of strongyli of the horse and reports seventeen different types, many of which have never before been reported in this country.

Necrotic stomatitis in pigs has not attained the seriousness of former years, but in calves it has been reported from several localities. It is the intention of the experiment station to publish

a bulletin on "Poultry Diseases" very shortly, which can be had for the asking and should be of interest to every veterinarian.

CONNECTICUT.

GROVE W. LOVELAND, TORRINGTON.

Matters of interest to the veterinary profession have changed very little since my last report. During the year six hundred and fifty-nine tuberculous cattle have been condemned under the direction of the commissioner, as against five hundred and thirty-seven last year. The owners received for the animals killed an average of $11.22 per head. Glanders has prevailed to the extent of three hundred and thirty-one cases, which have been destroyed.

Symptomatic anthrax has caused some damage among young cattle, and rabies has appeared occasionally in some of the border towns of the state.

Caloric erythema—the first that I have seen here—caused considerable damage to a herd of Holstein cattle in Goshen. All the white surfaces on these animals were completely divested of the outer layer of skin, leaving the parts raw and bleeding, and for a time they were a gruesome sight.

The new law prohibiting the bringing of any cattle into the state except those which have been tuberculin tested is working satisfactorily and was a step in the right direction.

At the July meeting of the examining board nine applicants took the examination, five of whom received licenses to practice.

DISTRICT OF COLUMBIA.

B. T. WOODWARD, WASHINGTON.

The practicing veterinarians of the District of Columbia have since our last meeting been favored with patronage by their clientele which has maintained their average prosperity, and with the exception of the addition of a few of this year's graduates from the local colleges there has been practically no change in the list of licensed practitioners in the district.

The year may be considered as having been quiet, as there has occurred no outbreak of glanders, or other serious communicable disease among live stock. The use of automobiles and especially of motor trucks has increased, but from interviews with numerous veterinarians it would appear that they have not reduced the volume of practice.

The demand for horses of special types has increased beyond the supply, and prices have accordingly reached a highwater mark.

The work of the bureau of animal industry in co-operation with the District of Columbia government, in the eradication of bovine tuberculosis stands as a prominent example of what can be accomplished by an efficient system, applied to a restricted area. At the inauguration of the campaign in November, 1909, it was found that eighteen and eight-tenths per cent of the District cattle were tuberculous, and that eighteen and three-tenths per cent of the premises harboring cattle were infected. These percentages were rapidly reduced, and are now being maintained at the low level of less than two per cent of tuberculous cattle, and three and six-tenths per cent of infected premises.

The United States College of Veterinary Surgery, and College of Veterinary Medicine, George Washington University, both of Washington, as a result of extensive investigation by the veterinary college investigating committee of the bureau of animal industry, and by representatives of the civil service commission, are included on the list of accredited colleges. Graduates of this year are therefore eligible for civil service examination.

It is with regret, the writer admits, that the Washington veterinarians fail to become enthused with the spirit of pride for our great organization, and that the obtaining of applicants for membership is a difficult task. Among our practitioners are a considerable number who have been ruled as ineligible, and this influence is felt. Those veterinarians of the bureau of animal industry in Washington who are not already members, are deterred from joining by the action of the department of agriculture in refusing to permit attendance at the meeting except with a complete loss of time, and entirely at personal expense.

The proceedings of the Association are always available for reference in the libraries, and the ownership of a copy does not hold the inducement usual in other communities.

IOWA.

W. W. Dimock, Ames.

For the sake of convenience this report is divided into three parts: *First, Official veterinarians of the state and their duties.*

State veterinary surgeon, appointed by the governor for a term of three years; assistant state veterinarians of whom there are fifty-five, all appointed by the governor.

The duties of the state veterinarian include supervision of all contagious and infective diseases among domestic animals within the state, and those in transit through the state, also to establish quarantine against infectious diseases and to enforce laws respecting importations of stock for dairy or breeding purposes; to cooperate with the local boards of health in the eradication of contagious diseases among live stock, and to take such action as the exigencies of the cases may demand.

The state veterinarian is authorized to manufacture and deliver at actual cost thereof, hog cholera serum; he is director of said laboratory, and an appropriation of five thousand dollars is allowed for carrying out the provisions of the act. The serum is furnished applicants upon their written request and when desired the state veterinarian or his authorized assistants administer the serum at the expense of the applicant.

The Iowa Commission of animal health consists of five members, the state veterinarian, chairman and chief executive officer, two veterinarians and two stockmen, each appointed by the governor for a term of three years. The commission is to hold at least two meetings a year, and has power and authority to make such rules and regulations as may be necessary for the prevention, suppression and quarantine of diseases among animals in the state and those being driven into or transported through. Such rules and regulations are to be effective when approved by the executive council.

The state veterinary surgeon and the two veterinarians on the board constitute a board for the examination of applicants to practice veterinary medicine, surgery and dentistry.

Second: Veterinary Education.

In dealing with the question of veterinary education in the state of Iowa, I wish to begin with the year 1909, briefly reviewing to date the development of the division of veterinary medicine of the Iowa State College. From what was practically a one man school without adequate quarters, equipment or funds, there has been developed a modern and model school for the teaching of veterinary medicine. This was made possible through liberal appropriations by the state legislature for buildings and equipment, from recognition and increased support through the board of education and the president of the college, as well as from the untiring efforts and liberal views of the present dean. In 1910 the entrance requirements were raised to fifteen units and the requirements

for graduation have also been materially raised. There are at present ten veterinarians on the faculty, seven of whom devote all their time to teaching in the veterinary division, one to experiment station work, one to extension work, the other to give instruction to two-year agricultural students. The alumni of the division of veterinary medicine are lending their support to its welfare, and many kind words come from the profession throughout the state. The board of veterinary examiners is now made up of competent, sincere men who give and conduct an examination that is worthy of the name. The state veterinarian is doing a good and much needed work and with his numerous able assistants reaches practically every part of the state.

The spirit of co-operation existing among the state veterinarian, the college and the profession has done much to further the interests of veterinary affairs, bringing about a closer relationship with the live stock interests and helping to obtain general support for the things we are trying to do. It has, I believe, greatly aided us in getting the support of our congressman and senators for our army veterinary bill.

Third: Diseases.

In discussing the diseases I will take up first the more common infective maladies. In many of these the etiology and morbid anatomy are well understood, yet we seem unable to arrive at any adequate and satisfactory method of handling them.

In various parts of the state rabies has occurred among our domestic animals, especially dogs. Persons bitten or otherwise exposed to infection may take the Pasteur treatment at the State University, Iowa City. When we consider the inadequacy of the quarantine measure both in efficiency and time in force, it is really marvelous that all the dogs in the state do not become affected with the disease.

Reports of emphysematous anthrax (blackleg) have come from a number of different sources.

Hemorrhagic septicemia is also quite common and appears to be often mistaken for blackleg; this statement is based on the fact that animals often continue to die following repeated vaccinations for blackleg.

Glanders has during the last year, given considerable trouble. Investigation shows that animals shipped into the state have, in practically all instances, been responsible for the introduction of the infection. The young horses of the state sooner or later suffer

from strangles and catarrhal condition of the nose or throat, and the complications that result through improper or lack of treatment often make a differential diagnosis necessary but frequently difficult, especially when such animals are found in a stable or field with a case of glanders. In general mallein has proven unsatisfactory as a diagnostic agent and the profession has about lost all confidence in it.

Dourine. Apparently the outbreak of dourine which occurred a year ago was practically cleaned up. All suspects are still in quarantine and but few are showing suspicious symptoms; no suspicious cases have yet been found outside the quarantine area.

While we possibly have more than our share of tuberculosis among farm animals the indications are that the stockmen are beginning to take an interest in the different methods of eradicating this disease from their herds and I believe that in time the great majority will come to see the economic advantage of ridding their cattle of this plague. This we believe will practically do away with tuberculosis in pigs and greatly reduce the number of cases in the human. The state veterinarian, in co-operation with some of his assistants, has cleaned up a number of dairy herds supplying milk to some of our smaller towns, consequently a few towns in Iowa obtain their milk from herds that are free from tuberculosis.

During the past year hog cholera was prevalent pretty generally over the state and the practitioners were unable to get a sufficient quantity of serum to meet the demands. At the present writing hog cholera is known to exist in only a few places, but as in the past, it will no doubt continue to be a great menace to the swine industry of Iowa, though by no means the only difficulty which we have to meet in hog raising. Intestinal parasites, especially in young pigs, are proving of serious economic importance.

Ulcerative or necrotic stomatitis is rather common in young pigs. It not infrequently terminates in healing of the ulcers and the formation of subcutaneous inflammatory swellings about the nose and mouth. These enlargements usually undergo necrosis and have a very offensive odor. The condition is often erroneously designated as bullnose. Rhinitis or snuffles in young shoats has been the cause of much trouble, this inflammatory process rarely terminating before invading the osseous structures of the head; the bones become larger and abnormal in form giving a

broad, thick bull or lion head appearance, and this is what we understand by the designation "bullnose."

Paralysis in young shoats affecting the hind quarters has become a very troublesome condition. All attempts to successfully treat this affection have given little or no results.

Enzootic Pneumonia. So-called chronic swine plague, has been unusually common in Iowa this season. It is characterized by a cough, more or less difficult respiration and catarrh of the respiratory mucous membrane. The disease is but slightly contagious, with low mortality, and the anatomical changes consist chiefly of a chronic broncho-pneumonia. Enzootic pneumonia is of considerable importance scientifically on account of its confusion with hog cholera and economically because of retarded growth as well as actual death in many cases.

During the last two years we have had some very serious outbreaks of chicken cholera or hemorrhagic septicemia. In some instances flocks of from five hundred to one thousand have suffered a loss of ninety-five per cent from the disease. We were able to demonstrate that in many cases the infection was carried from farm to farm by streams.

There exists in the state another very fatal disease of poultry that has some of the characteristics of cholera but we find in the tissues a bacillus that differs morphologically and culturally from avisepticus and instead of the characteristic hemorrhagic lesions, especially on the heart, we find an exudative inflammation of the parenchymatous organs, being marked on the heart and liver.

During the college year 1910-11 chicken paralysis was rather prevalent and because of the possible connection between it and infantile paralysis we received many inquiries, and cases for examination. All attempts to transmit the disease by inoculation failed. Around the plexus supplying the affected leg or wing we found an inflammatory new growth composed of fibrous tissue cells and fibrin. The endoneurium of the nerve trunk passing through the involved plexus was materially thickened by the formation of fibrous tissue.

Heterakiasis. In the fall of 1911 there existed pretty generally over the state a disease among young poultry, more especially the principal manifestation of which was a wasting or atrophy of the muscular system. The disease did not spread from one to another from contact or association nor could it be transmitted by inoculation from the blood or tissue juices. We found

in the cecum of every bird posted large numbers of the heterakis papillosa, from thirty to five hundred and sixty-one, usually about one hundred to one hundred and fifty. As we were unable to transmit the disease or demonstrate the presence of any tissue change or morbific agent we believe the parasite to be the cause of the wasting and death.

Sclerostomiasis. Infestation with the sclerostomum equinum (strongylus armatus) has given a great deal of trouble, and in some parts of the state has been the cause of many deaths, especially in young horses, one to four years of age. Reports of this trouble began to come in during the fall and continued until late in the spring. The first deaths were apparently all from acute attacks and showed upon post-mortem examination the agamous parasite in the arteries; later the cases became chronic, the animal showing a condition of ill health and emaciation for many weeks. Upon autopsy the arterial lesions were of a chronic character but hundreds of the mature parasite were found in the intestinal content.

Acariasis. Mange of the horse, both sarcoptic and psoroptic has occurred in a number of localities.

Trichinasis. During the last year a number of persons, near Marshalltown, Iowa, died from trichinosis following the ingestion of pork sausage that contained the Trichinella spiralis.

Many sheep shipped in for feeding purposes were affected, usually within a few days after arrival, with a disease apparently new to this section of the country. It is characterized by a high temperature (104° F. to 107° F.), depression, loss of appetite, muco-purulent discharge from nostrils and eyes, sometimes keratitis. Nodules and vesicles form in the skin of the head, inside of thighs or on external genitals. There is more or less edema of the ears, face and nose and usually a profuse diarrhea. In a large per cent of the cases the respiratory tract is affected, indicated by dyspnea.

Post-mortem examination reveals, in many cases, besides the skin lesions, a catarrhal pneumonia accompanied by small areas of caseous necrosis. There is also a hemorrhagic inflammation of the upper respiratory and intestinal tracts. Clinical symptoms and post-mortem lesions observed are almost identical with variola or sheep pox of Europe and malignant catarrhal fever of South Africa and which in all probability is the same disease.

Forage poisoning has caused heavy losses on some farms; the

heaviest as a result of feeding mouldy ensilage while other feeds such as fodder ear corn and hay were much less responsible. Stockmen are frequently ill-advised by writers on agricultural subjects or by an over zealous salesman in regard to feeding ensilage to horses, consequently insufficient care is exercised in selecting only clean and sweet ensilage for horses.

Azoturia is encountered rather frequently, always affecting our best horses and associated with high mortality.

Six cases of traumatic pericarditis in dairy cows have come under my personal observation within the last year. One of the best dairy cows in the state was saved by the removal, through the rumen and reticulum, of a nail that was penetrating the pericardium.

The live stock interests of the state are looking directly to the veterinarian for methods by which the loss of animals from disease may be lessened. The general public and local boards of health expect us to give them a pure milk and meat supply and to prevent the spread of intercommunicable diseases.

We feel that nine-tenths of all the ways by which infectious diseases spread either from animal to animal or from animals to persons are within the power of man to control. That this may be accomplished let us begin at the foundation, let each college instill into its students all the fundamental principles and specific facts necessary for the efficient handling of the numerous problems that are coming to the veterinarian; let us impress upon them that they are not graduating to go into business, but rather that they are entering upon the practice of a profession, and that they must ever keep in mind, when making rules and regulations, "That the interests of the many shall dominate over the selfish assertion of individual rights."

In this report an attempt has been made to name and briefly describe the more important diseases and problems which we meet and to give the profession some idea of the organization we have to work with.

I wish to thank Doctors C. H. Stange, J. I. Gibson and others of the profession in the state for data furnished, and suggestions in making up this report.

KANSAS.

Kirk W. Stouder, Manhattan.

As Resident Secretary of Kansas it is a pleasure to report that the present season has been a prosperous one for the live stock interests and as a consequence members of the veterinary profession are enjoying good business generally.

During the latter part of the season of 1912 feed was scarce and live stock suffered accordingly, but comparatively few were lost until the winter storms set in; these were unusually severe and as feeders were unprepared with either food or shelter the losses were high, particularly in the extreme western part of the state. Through co-operation of the railroads, however, furnishing free transportation of feed, this loss was materially lessened. Grass the present season surpasses that of former years and prices of cattle and stock of all kinds are high, this, coupled with the prospect of plenty of feed and an easy season makes live stock in demand with every effort to conserve that at hand.

Last season Kansas throughout most of its counties experienced a severe outbreak of hog cholera. Potent serum from reliable firms was in great demand, though at times it was not obtainable. In many localities where the veterinarians were careful to use nothing but good serum, made after the Dorset-Niles process, the farmers are loud in its praises as a power to save hogs from death in cholera. In other localities the reverse is true perhaps in a large measure due to the use of poor serum, improperly made and in some cases to the use of materials not serum at all.

The state of Kansas has a laboratory at Manhattan supplying serum at one and a half cents per cubic centimeter. At times supplying over 400,000 cubic centimeters per week, and at present manufacturing about 75,000 to 100,000 cubic centimeters weekly.

Tuberculosis control in this state is vested in the live stock commissioner and the local veterinarians are usually assigned to the testing of animals in their localities upon application for a test made by the owners or when in the opinion of the commissioner suspicious animals should be tested. Considerable encouragement is given to municipalities to create milk and meat inspection ordinances and in this work the office of the live stock commissioner gives a great deal of assistance and supervision. The relations of interstate handling of live stock and the inspections necessary are not enjoying complete harmony, but progress is being made.

During the last year the live stock commissioner has retained one veterinarian permanently as a veterinary assistant to offer technical advice where necessary and to help establish better control of the work; this is probably an entering wedge for a state veterinarian in Kansas, an office which has never been created.

Personal visits by the writer to nearly every veterinarian in the state at some time during the present season established evidence that though the automobile has replaced the driving horse in many cities and towns, the fine draft animals, on the other hand, are worth considerable money; moreover, as cattle are high in price and as the careful man can materially benefit the hog raiser through controlling hog cholera, these factors indicate that the veterinarian has an assured practice which probably never was more remunerative, and if carefully conserved will likely be a permanent and very satisfactory occupation.

Several of the older practitioners of the state have added assistants and a number of new men have located in the state.

Attempts were made at the last meeting of the Kansas state veterinary association to lower the requirements for admission of members but did not materialize; the requirements are the same as those of the American Veterinary Medical Association and several men not now eligible have signified a desire to enter both associations and apparently quite willing to await the time when they will become eligible.

Facilities for instruction were increased the past year at the veterinary school of the State Agricultural College; the force of teachers was strengthened and two of the faculty are at present abroad on leaves of absence engaged in travel and study of veterinary education.

MAINE.

A. Joly, Waterville.

As Resident Secretary for Maine, I regret to say that there is nothing of especial interest to communicate.

The state has a board of veterinary examiners; but the laws are not what they should be. A layman occupies the office of live stock sanitary inspector.

We have a veterinary medical association with a large membership,—it meets every three months and always has a large attendance.

Glanders, tuberculosis, hog cholera and bovine infectious abortion are among the communicable diseases Maine had to fight during the last year.

MARYLAND.

F. H. MACKIE, BALTIMORE.

This report must be to a great extent a repetition of my reports of previous years. The members of our profession appear to be prosperous and the numbers continually increasing, the 1912 graduates numbering from sixteen to twenty.

Our laws governing the practice of veterinary science stand as they have for several years back; several amendments introduced in the last session of the general assembly met the usual defeat, much to our chagrin. I think, however, the profession is largely to blame in this matter owing to the very lax manner in which the members support these measures.

Our legislature provided for the establishment of a laboratory for the production of biologic products to be used in the diagnosis, prevention and treatment of diseases of live stock and much good should come from this measure.

The diseases of our domestic animals present very much the same condition as several years back. Hog cholera seems to show an increase. Anthrax has missed us for the last three years. The so-called cerebro-spinal meningitis or forage poisoning has decreased largely during the last few years owing to the education of the horse owners. Swamp fever is still with us but is on the decrease to a great extent.

Tuberculosis although appearing to show an increase owing to the greater number of cattle tested, is, I think, on the decrease and will be eventually eradicated, but probably not in the immediate future.

MASSACHUSETTS.

FRANCIS ABELE, JR., QUINCY.

As Resident Secretary for Massachusetts, I present the following annual report:

The volume of business seems to have been about as usual, in spite of the added number of automobiles.

There has been an increased amount of veterinary legislation in which the veterinarians have been remarkably inactive. A law

has been passed abolishing the "Cattle Bureau" and creating in its stead a "Department of Animal Industry," and a layman to succeed Dr. Austin Peters was appointed chief, with a salary increased from $1,800.00 to $3,500.00, and for a term of five years instead of one. Doctors F. H. Osgood and L. H. Howard were appointed consulting veterinarians, each with a salary of $1,000.00. Dr. Osgood had previously served as chief of the cattle bureau. The control of this bureau, or, as now called department, was sought by the state board of agriculture, the state board of health and the bureau chief. The chief, Mr. Walker, winning out.

The control of glanders in the city of Boston was given over to this department, although opposed by the local board of health; this action was in anticipation of a state payment for glandered horses.

The inspection of import cattle, which at our last meeting was in charge of Dr. Paige, is now in charge of Mr. Field, with the assistance of a graduate veterinarian.

Three bills were offered, aiming to improve the milk supply; but as more activity was shown by the dealers than by the consumers, no action was taken.

The humane society has been actively assisting in enforcing the law against bob veal.

The Massachusetts veterinary association has closed a fairly successful year. One meeting was in conjunction with the master teamsters' association, discussing glanders. At another meeting Representative Ellis explained his milk bill. A small animal clinic was held at Dr. Lee's hospital, and the annual banquet on April 22, was well attended. Dr. Cleaves was re-elected president and Dr. Seale secretary.

The annual harbor trip in June, found fifty members and guests on hand and a decidedly good time was reported by all.

The Massachusetts department of animal industry reports for the last year: 2,800 cases of tuberculosis in cattle; 106 cases of tuberculosis in swine; 952 cases of glanders, of which 387 were from Boston, and 130 cases of rabies.

MISSISSIPPI.

E. M. Ranck, Agricultural College.

At a meeting of the Mississippi live stock sanitary board held after the legislature adjourned last spring a number of regula-

tions were added to those already in effect. Among them was one authorizing the state veterinarian to appoint assistant state veterinarians who were to be distributed over the state and paid by the various county boards of supervisors, or the people for whom the work was done. It was also ordered at that time that hog cholera serum should be distributed at actual cost instead of being given free to the people, as it was found that the previous method was impracticable with the amount of money set apart for such work. Orders were also given to train special men or students at the agricultural and mechanical college to do certain work, especially serum-simultaneous inoculations against hog cholera; these men to be paid by the people for whom the work is done and employed in districts where no competent veterinarians are located.

We have received in this state in the past year a great many animals intended for breeding purposes. Our regulations require all animals entering Mississippi for breeding or milk purposes to be accompanied with a health certificate from a competent veterinarian recommended by the official from which state the animal was exported.

The work toward tick eradication is probably making more progress in this state than in any other below the line. During the past year one county in the southwestern part of the state was declared free, although many miles below the regular established quarantine line. This practical demonstration has done a great deal to allay opposition to the work and has proven conclusively that it is thoroughly practical. Sections of other counties will be declared free this fall; parts of these counties are now declared to be free from ticks. The eradication work is conducted under the direction of the federal bureau of animal industry and we have about twenty men in the state employed by the government engaged in this work. The state is furnishing some twenty men who are paid out of a special appropriation, and each county in which the work is being conducted furnishes several men for their part; altogether this makes a very good force and wonderful results are accomplished. Tick eradication has done much toward educating the people to the necessity of employing thoroughly competent and reliable members of our profession, in fact there are counties with qualified veterinarians comfortably located where, before the advent of the tick eradication laws went into effect, no professional men were to be found.

Some opposition has been registered against this work, but in spite of this, it progresses in a very satisfactory manner.

Hog cholera has prevailed all over the state this past year. We attribute many of these outbreaks to importing animals that have recovered from the disease but still infectious and capable of introducing the disease into local herds. We have had a good deal of trouble in educating people to the proper disposition of dead animals and hope to have more stringent laws passed at our next legislature covering this point.

We have had four outbreaks of anthrax in this year, mostly on overflowed lands and all ably handled by assistant state veterinarians under the direction of the state official. One outbreak in the delta was especially well handled and stamped out by the usual methods. Bacteriologic tests were made at the agricultural and mechanical college and the anthrax bacilli found.

Several of the assistant state veterinarians have reported from time to time forage poisoning, including the common sneeze weed, as killing stock. Several outbreaks of blackleg were reported in different sections of the state. Tuberculosis has been found in a few of the small herds this past year; the diseased animals were properly destroyed and premises disinfected. Shipping fever in horses has become a very important factor in Mississippi, and it is now considered one of the most important diseases to guard against. We have had one or two outbreaks of glanders reported which have been handled by our assistant state veterinarians in a very satisfactory manner.

Our state veterinary medical association is thriving in enthusiasm if not in numbers; there are scarcely twenty-five regular graduates practicing in this state, and there are a number of locations which it is hoped will be filled by young men from the northern colleges in a very short while. A movement has been started in the state to establish a veterinary school in connection with one of our educational institutions in the near future.

An act providing for the protections of practitioners in our profession was introduced at the legislature last session. It passed the committee but owing to the stress of other business was never brought up for final passage. The committees of both houses, however, approved it and we have every reason to believe that at the next meeting of the legislature it will become a law.

The state live stock sanitary board is doing a great deal of work for the amount of money that has been set apart for this

purpose. Twenty-five thousand (25,000.00) dollars was appropriated for the eradication of the tick and ten thousand (10,000.00) dollars for hog cholera. Since the middle of April this board has distributed to the farmers of this state over one-half million cubic centimeters of anti-hog-cholera-serum. We have had reports at the state veterinarian's office to the effect that a number of outbreaks of this disease have been very promptly stamped out by the serum alone treatment. While we do not recommend this treatment as a cure our records show that where the animals are not very ill they will respond promptly to the serum treatment. The experiment station connected with the agricultural and mechanical college has planned a number of experiments which will be conducted this fall studying hog diseases in some new phases, especially as they exist in some sections of the state. A number of cities have passed ordinances to establish milk inspection and are requiring all animals furnishing milk for these municipalities to be tested with tuberculin.

MONTANA.

A. D. Knowles, Livingston.

I have the honor to submit my annual report as Resident Secretary for Montana, and wish to quote from a letter just received from the state veterinarian, Dr. M. E. Knowles: "Replying to your favor of recent date beg to advise that the general condition of live stock in Montana has never been so good as it is at the present time. It is true that we have developing from time to time a few cases of glanders. Tuberculosis in our most populated counties ranges from ten to thirty-five per cent; we believe, however, that we have the situation in this respect well in hand and that should the legislature continue the present appropriation we will be practically rid of bovine tuberculosis within the next four years.

"We are rigidly enforcing our importation laws, by this means keeping out glanders and tuberculosis. In fact the general condition is so good that it leaves little to be said."

Some cattle scabies exists in a few of the range counties but through a system of co-operative dipping vats, the co-operation of the United States bureau of animal industry and the state live stock sanitary board the disease is being rapidly and satisfactorily cleaned up. It is thought that it will soon be entirely eradicated.

The United States department of agriculture is carrying on a poisonous plant investigation with a camp established near Gray Cliff, Montana, under the direction of Professor Marsh, of the bureau of plant industry, together with a corps of assistants and Dr. John S. Buckley of the bureau of animal industry. They have a field rich in poisonous plants and it is the hope that much good will come from their work.

A number of lawsuits have been tried against the live stock sanitary board during the past year, and in every case the board's actions have been upheld by the courts, establishing the stability of our live stock sanitary laws.

The Montana Veterinary Medical Association is growing in interest and numbers and expects to again present a bill to the legislature next winter aiming to regulate the practice of veterinary medicine in this state.

The veterinary department of the state agricultural college, under the direction of Dr. W. J. Taylor, has made some substantial improvements during the past year.

Dr. F. S. Gray, after serving as a special deputy state veterinarian engaged in the tuberculin testing of dairy cattle in Montana for nine months, became infected with actinomycosis in the right jaw about February of the present year and after remaining in a hospital in Helena for three months returned to his old home in Natick, Mass. At the present writing the doctor is reported to have entirely recovered.

NEVADA.

WINFRED B. MACK, RENO.

While Nevada's chief agricultural product has always been live stock, the state has, in the past, afforded but a limited veterinary practice. It differs but little in that respect from other states in the intermountain region where much of the stock lives upon the open range. But few able veterinarians have been attracted here, while transient quacks have imposed upon the people until many of them, acquainted with no other type, have not the confidence to employ a qualified practitioner. However, with the agricultural development now going on, the improvement in the quality of live stock, the high prices prevailing for live stock and the advent of a few competent veterinarians, conditions for practice are gradually improving. It is hoped that these condi-

tions will eventually attract a few good men and that the quacks will find this a less profitable field. At the present time if first class men would locate here and by skillful work merit the confidence of the public, they could eventually build up a remunerative practice in several towns.

During the year hog cholera appeared in some of the valleys in western Nevada with the usual result. In a few herds the disease was reported and the Dorset-Niles hog cholera serum used. In those instances the disease was promptly checked. Aside from that outbreak there was no serious epidemic of infection at any point in the state. Strangles and influenza have been more or less prevalent as is always the case in horse breeding districts. There is no glanders in the state except in one restricted locality. Anthrax occasionally appears but the losses are small as vaccination has become current on the appearance of this malady. There is a very little tuberculosis in dairy cattle and hogs but it is not of very great importance from an economic point of view. Equine anemia has apparently almost disappeared. Scabies in sheep is practically eradicated and altogether the health of our domesticated animals is good.

NEW YORK.

John F. DeVine, Goshen.

As Secretary last year I gave a rather full report of all matters pertaining to veterinary interests in New York state, and, as the conditions which obtain this year are much the same as last, my report can therefore be greatly reduced by offering for reference last year's report with the exception that in addition to the information supplied concerning glanders, tuberculosis, rabies, anthrax, and black leg, I would add that we have had one known outbreak of sheep scabies, one of contagious abortion in sheep causing several deaths and one outbreak of lip-and-nose ulceration; also, that infectious swine disease has been more prevalent and more virulent than the state has ever experienced before, a number of outbreaks being apparently due to the necrosis bacillus. Such outbreaks ordinarily responding quite satisfactorily to dipping of the animals and the disinfecting of the pens and runs; serum being of no apparent value in cases of the latter character.

Veterinary matters in the state as a whole seems to be in a satisfactory condition; practitioners whose work is especially con-

fined to equine practice have felt the effects of comparatively recent legislation which was inimical to horse breeding and racing. The advent of the automobile truck has had some effect on the practitioner of large cities, but it is likewise true that new avenues of interest to the veterinarian along the lines of sanitary control work have been opened.

There is a constant increase in the numbers of licensed veterinarians who are naturally replacing the older men and making it less inviting to the illegalized class.

NORTH CAROLINA.

M. J. Ragland, Salisbury.

The veterinary association of this state has a membership of twenty-five graduate veterinarians, the eleventh annual convention having been held in Raleigh, June 25th and 26th. The next annual convention will be held in Salisbury in June, 1913.

The state examining board issues licenses for practice in this state after applicant has passed a satisfactory examination.

About twenty-five counties have been freed of ticks since the work was begun in 1906; forty-five counties were tick free at that time and about half of this number having been freed by state work previous to 1906. There yet remains about thirty tick infested counties.

Hog cholera has been prevalent throughout the state during the past year, but its ravages have been held in check by the use of immunizing serum. Very little glanders exist, an isolated case being found only at rare intervals. Tuberculosis occurs in a very small percentage of cattle; a tuberculin test is required for all dairy and breeding cattle entering the state. Health certificates were formerly required for horses entering the state, but this regulation has been modified to include only animals to be used for breeding purposes.

Aside from the above mentioned diseases animal parasites are widely recognized as factors contributing to the ill-health and loss of live stock in North Carolina.

NORTH DAKOTA.

W. F. Crewe, Devil's Lake.

Veterinarians in this state have reported a very busy season. With excellent prospects for a bumper crop it would indicate a prosperous financial condition for the coming year.

There has been no change made in the laws regarding live stock sanitary control work since the last year.

Our state association is in a very thriving condition; the winter meeting was well attended and quite a number of new members added. Such interest was taken at that time that it was decided to hold a midsummer meeting which will occur July 23rd, 24th and 25th.

Dr. J. W. Adams, of Philadelphia, will demonstrate the operation for the relief of roaring.

We regret to have to report the death of Dr. J. B. Campbell, of Larimore; he was kicked by a horse from which injury he succumbed in a few hours. Dr. Campbell was one of our older practitioners and a great favorite with all the members.

OREGON.

W. Dean Wright, Portland.

Since the 48th annual meeting, the Oregon veterinarians report quite a little progress, not only in the way of an increasing and prosperous practice, but the general attitude of the public toward the profession shows evidence of a more marked appreciation.

A meat inspection ordinance presented to the Portland city council aroused considerable public sentiment and at the same time no small amount of opposition was evidenced. A veterinary inspector, meat inspector and inspector's assistants were to have been employed to carry out the provisions of the ordinance, but as yet no definite action has been taken by the municipality looking toward its immediate enactment.

Milk inspection is still receiving the hearty support by the Portland municipal officers and the tuberculin test is exacted of all cows furnishing city milk supply, cleanliness as well as sanitation being given considerable attention; new dairy barns are being built, milk houses remodeled and new equipment is being installed by a number of the dairymen. The city milk inspectors report a much smaller percentage of tuberculin reactions, due no doubt to the effort that is being made to eradicate the disease from the dairy herds in the vicinity of Portland. Public opinion and the courts look with much disfavor upon violators of Portland's milk inspection ordinance and most all "cases" prosecuted by the city board of health have been decided in favor of the plaintiff.

Contagious diseases prevail more or less throughout the state; glanders having been evidenced through the mallein and complement fixation tests, all animals showing clinical symptoms or those giving a positive reaction to the latter test have been destroyed.

Scabies in cattle in Lake and Klamath counties prevails to a very limited extent as compared with the severity of the disease reported the last few years. The exposed herds from this district heretofore have used the national forest reserve for summer pasture without any marked health restrictions, a federal order exacting a certificate from an employee of the bureau of animal industry before cattle are permitted on the reserve, places the cattle within the infected zone more closely under the supervision of the inspectors. Dipping, spraying and segregation of infected animals, coupled with frequent inspections and mild climatic conditions have lessened the disease to a very appreciable extent.

Scabies in sheep has been reported as follows:

Klamath County one center with 300 infected.

Lake County six centers with 15,832 infected.

Douglas County two centers with 6,400 infected.

Malheur County two centers with 4,700 infected.

Sheep owners in southeastern Oregon counties assemble all of their bucks into one or several herds and run them together for the summer unknowingly endangering the health of the combined herd should one of them happen to be affected; this is especially evidenced with wrinkly animals or those having belly lesions. A dipping order from the state sheep inspector will, no doubt, soon be promulgated.

Contagious abortion in cattle has been prevailing among some of our best registered dairy animals. Some time ago a number of registered cattle were imported from the Jersey Isles, an epidemic of abortion followed the introduction of these animals into the different herds. The disease now appears to be abating. Hog cholera prevails to a limited extent and the disease can for the most part be traced to public stock yards. The hog industry here is only in its infancy and an epidemic of cholera obtains to a limited extent solely because of the small number of susceptible animals.

"Salmoning" of dogs has received the attention of Dr. E. F. Pernot, Bacteriologist, of the state board of health and a bulletin has been issued citing the causative factor of that affection and

giving in detail the symptoms, post-mortem appearances, treatment of affected animals, together with the result of culture growths from salt water salmon and from salmon trout from the fish hatchery at Elk City as well as the microscopic examination of fish. Seven dogs are included in the experiment. The following appears under the heading, "Cause of the Disease": "A close examination of the blood-like material along the back of the fish reveals numerous small white spots which when placed under a low power microscopic lens, prove to be amoeba; as the fish is cold blooded a warming stage is unnecessary to note active movement. Soon after being removed from the fish the amoeba becomes encysted and remains motionless. These are evidently fresh water amoeba that become parasitic to fish but not pathogenic to them."

TENNESSEE.

M. JACOB, KNOXVILLE.

The progress during the past year toward improved conditions relative to the veterinary profession in Tennessee has been eminently satisfactory. One of the greatest achievements has been the passage of an amendment to the veterinary practice act, whereby the law ever since September 1, 1911, applies to the entire state instead of only to counties having a population of forty thousand or over, as was originally the case. The result is that Tennessee now has one hundred and fifty-two licensed practitioners.

The Tennessee veterinary medical association has also shown a progressive spirit. At the last annual meeting which was held at Columbia, Tennessee, ten new members were elected, making a total of forty-seven active members. The next meeting will be held in Knoxville, at the University of Tennessee, during the month of November and indications point to another large increase in membership. The association has had a most wholesome effect for the advancement of the interest to the veterinary profession in this state. The members have been unusually loyal when called upon to use their influence with our congressmen for the army veterinary bill.

State sanitary work has been placed upon a scientific basis and during the past year has made good progress, especially in the work of tick eradication and as was indicated in my last report, the day of the "cattle tick" in Tennessee will soon be a thing of

the past. The University of Tennessee as usual continues to show its increased interest in the veterinary profession by more liberal financial support. During a recent meeting of the board of trustees, the chair of veterinary science was changed from an instructor to a full professorship.

All in all, we have good cause to be satisfied with the recent change of conditions in Tennessee, but I feel sure that there are still better things in store for us and the veterinary profession in this state can always be relied upon to do its share toward healthy progress.

TEXAS.

R. P. Marsteller, College Station.

The act regulating the practice of veterinary medicine, which was passed by the legislature, has been sustained in all test trials and nearly one hundred graduate veterinarians having passed the examinations, have been given certificates.

Veterinary education is receiving some notice. The board of veterinary examiners passed a resolution recommending that a regular course in veterinary medicine be given at the agricultural and mechanical college, and the board of directors of the college, at a recent meeting, took favorable action, voting to recommend an appropriation of $150,000.00.

The veterinary department of the Texas experiment station inoculated twenty-five head of Hereford and Shorthorn bulls for the Brazil Land, Cattle & Packing Company, Sao Paulo, Brazil. If this proves a success, and we have every reason to believe it will, South American countries will buy many United States cattle. The department is continuing its investigations of infectious anemia, the production of hog cholera serum and has, also, given some time to sore mouth of dogs as well as infectious abortion of cattle.

The live stock sanitary commission now employ a qualified veterinarian, who gives all his time to veterinary sanitation and police; it is doing everything possible, with funds available, to control contagious and infectious diseases, and eradicate ticks and mange.

The Texas veterinary medical association has eighty members in good standing. The last meeting, held at Fort Worth, March 18 and 19, 1912, was by far the best in the history of the associa-

tion. The bureau of animal industry, Fort Worth veterinarians, Fort Worth packers, and Hon. Ed. C. Lasater, who supplied twenty head of tuberculin reacting cattle for post-mortem examination, contributed largely to the success of the meeting. Doctors R. C. Moore, A. T. Kinsley and F. S. Schoenleber honored the association with their presence, and took an active part in the proceedings.

Veterinary affairs in Texas seem to have a bright future.

UTAH.

H. J. Frederick, Provo.

My report for this year will be rather short, as very little has happened of special interest to the profession during the past twelve months. The state veterinary medical association is in running order and a very entertaining meeting was held at the agricultural college in February where the veterinarians assembled to enjoy a most profitable program and clinic. Quite a number of new veterinarians have located in the state during the past year. Utah is quite well supplied with veterinarians at the present time and all seem to be doing nicely, as better live stock is constantly being installed and properly looked after.

Inspectors of the bureau of animal industry and state officials continue to test cows for tuberculosis in different parts of the state and are doing very good work. If this plan is pursued and properly looked after, it will not be long before Utah will be free from the disease. Other diseases are about the same as were reported last year and some progress has been made toward overcoming them.

VERMONT.

F. A. Rich, Burlington.

The crop of Vermont applicants for membership in the American Veterinary Medical Association promises to be very small this year as but one application has been received to date.

We are still in the market for state legislation to regulate veterinary practice and conditions look more favorable for securing something of the kind, during the coming session of legislature, than ever before.

No new contagious diseases have been reported in the state

during the past year, but hog cholera has been rather more prevalent than usual, especially on the west side of the state.

Live stock owners in Vermont probably suffer the greatest loss from infectious abortion in cattle, while bovine tuberculosis and blackleg seem to be the second and third most common infectious diseases.

The efforts of the state toward the control of bovine tuberculosis have been less effective during the past two years than formerly because of the limited appropriation of forty thousand dollars a year for that purpose. The state continues to pay an indemnity of seventy-five per cent of the appraised value of condemned cattle, with a limited appraisal of fifty dollars per head. A few cases of glanders and one of anthrax were reported during the year.

WEST VIRGINIA.

L. N. Reefer, Wheeling.

In submitting this, my annual report for the year ending with this meeting, I am sorry to say that nothing has transpired which is of interest to the profession in general except that the United States senators and congressman from West Virginia have given their assurance that they will give favorable consideration to the army veterinary legislation when it comes to a vote. At the next meeting of our state legislature, which will be June, 1913, the veterinarians of West Virginia will for the third time present a bill and ask for fair treatment in a law to protect the practitioner and we have hope of its successful consideration.

REPORT OF COMMITTEE ON LEGISLATION.

W. Horace Hoskins, *Chairman*.
W. G. Hollingworth, J. R. Mohler,
F. H. Schneider, James Robertson.

To the President and Members of the American Veterinary Medical Association:

As Chairman of the Committee on Legislation, appointed at your hands one year ago, there was placed before our Committee two propositions involving the hope of federal legislation to make them effective.

The first one was that of securing recognition with rank and commission for the veterinarians in our federal army service; the second, that of endeavoring to obtain a federal license for all veterinarians electing to take a federal examination, under the auspices of the civil service commission with a view of establishing such a standard in our own country as would give status to our veterinarians in all foreign nations, and provide for those of our number engaged in our foreign veterinary service a definite standard of excellence for veterinary education in the United States. Also that it would be within the province of every state regulating the practice of veterinary medicine and surgery by statute to accept in lieu of an examination a federal license thus removing one of the great objections that confronts every member of the profession, who desires to change his location from one section of our country to another, or, who wishes to remove from one state to an adjoining one. The fact that every state law has some section in conflict with the laws of other states makes the hope of reciprocity between state boards hopeless so far as practical results are concerned, while, on the other hand, it would be an easy matter for any state to modify its law and accept in lieu of an examination a federal license that would be gained solely through merit and ability and would have none of the dangers to run that confronts every state board and that establishes as many distinct standards as there are state laws.

Owing to the fact that army legislation had been struggled for during the past score of years, the Committee, after due consideration, decided that it could not divide its strength and efforts between two laws, and feeling very deeply the humiliating position of those in our army veterinary service, they, at the outset, decided to press only for recognition for our army veterinarians, and allow the second proposed measure to rest for the time being.

Let me say to you, Mr. President, that the service rendered by the veterinary profession all over this land in the campaign inaugurated by your Committee, has been of such a character that I can recall no similar volume of work performed by the profession during the past thirty years in behalf of any measure of national, state or municipal character. It would be a task beyond your Committee's ability to attempt, to refer at any length to the services rendered by any state or to attempt to single out an individual in this great campaign, all have rendered very great and valuable assistance to your Committee. More than 100,000 ap-

peals were sent forth to the profession all over the land, and we venture to say it is the first time in the history of our country when every member of a congress numbering some three hundred and ninety-two, and a senate numbering some ninety-six, were ever made so thoroughly aware of the deep interest that any single body of men had in legislation that was for the welfare of the people they represented, as well as for justice and a square deal to any profession or calling in our land. We will not attempt to trace the many steps of this proposed legislation, nor to refer, at any length, to the watchful care your Committee have been forced to exercise in securing the passage of our bill through the house military committee, but, cannot refrain from paying tribute to Chairman Hay of the house military committee whose patience and co-operation with all our efforts made it possible for our bill to pass the house. While our difficulties have been many and very trying indeed at times in the house, they were thrice greater in the senate, where we were unable to secure action by the senate military committee, but it must be of great satisfaction to every member of this Association to realize that more than fifty of the senators have committed themselves to the support of the bill to the various members of the profession in their respective states.

Let me say to you, Mr. President, that though your Committee have labored diligently, we feel that to the body of splendid workers under your direction, is due the greatest credit for this country wide campaign for recognition of our profession and is the greatest expression of fidelity to the profession's best interests and must add much gratification to you in years to come of the great interest in the success of your administration. To every member of this Association and to every devotee of the profession, your Committee extends grateful appreciation.

REPORT OF COMMITTEE ON PUBLICATION.

Richard P. Lyman, *Chairman.*

R. W. Ellis, C. J. Marshall,
G. Ed Leech, G. B. McKillip.

During the fiscal year now closing your Committee on Publication has published under an authorization from the Association, the annual report of the Convention for 1911, the proceedings of

the Association of College Faculties and Examining Boards of North America, and also the Tuberculosis Primer, the latter a contribution emanating from the Commission for the Study of Methods of Control of Bovine Tuberculosis.

Advertisements for bids to accomplish this printing were distributed among several publishing houses in the form of the following letter:

"Gentlemen:—

"You are invited to submit a bid for printing, binding, wrapping, addressing and mailing the report of the meeting of the American Veterinary Medical Association held at Toronto, Canada, Aug. 21 to 25, 1911. Bids are to be based upon the following conditions:

1. "The Publication Committee will deliver to the successful bidder the report properly arranged and legibly typewritten.

2. "The contractor shall print true to copy without submitting proof to authors for correction, except by special request of the Chairman of this committee. In special cases of tabular or otherwise intricate matter proof may be sent to the author, who shall then be allowed two days for correction in addition to the time consumed in transit.

3. "The material and workmanship shall be uniform with the report of 1910, a copy of which is herewith submitted as a part of the negotiation.

4. "The contractor shall print, bind, furnish wrappers, wrap in printed wrappers like that submitted on sample copy, and shall legibly address and mail the same according to the mailing list furnished by this committee; he shall thereafter deliver any remaining copies, wrapped, to the librarian of the Association (Dr. W. L. Williams, Ithaca, New York) within sixty days after the typewritten copy has been delivered to the successful bidder.

5. "The estimated size of the volume is five hundred and thirty-five pages and plain end sheets. Bids are to be based upon an estimate of fifteen hundred copies, with rates for each page more or less, for alterations from copy per hour, and for an extra hundred copies at the option of the committee. You are also requested to quote figures for manufacturing halftones, printing and binding each insert on eighty or one hundred pound enamel book paper (we to furnish the photographs).

6. "The estimate is also to include one insert upon one hundred pound enamel book paper as per frontispiece in sample submitted, and likewise price for making and printing zinc etchings (we to furnish the photographs or drawings).

7. "Bids are to be submitted for the entire work to be delivered within sixty days as per paragraph (4) four.

8. "You are also requested to give an estimate for printing and binding (paper cover) twenty-five hundred or more copies of a primer to include approximately sixteen pages.

9. "Bids are to be addressed to the undersigned as early as practicable.

"Yours very truly,

"Chairman of Committee."

The contract was awarded to The Robert Smith Printing Co., your Committee having accepted their bid as embodied in their letter under date of September 13, as follows:

Dear Sir:—

As per your request of the 8th, we are pleased to submit to you the following prices on your 48th ANNUAL CONVENTION REPORT:

NUMBER OF COPIES, 1,500.

NUMBER OF PAGES, 536, and plain end sheets.

TYPE PAGE, 24x43 picas.

COMPOSITION, to be similar in every respect to the sample copy submitted.

TRIM SIZE, 6x9⅛.

BINDING, to be cased in book with sprinkled edges, and bound similar to the sample copy.

PRICE, $1,361.44, or $2.54 per page.

"For the above price we have figured to have a printed wrapper around the book, same to be sealed, and the book to be tied and wrapped in corrugated board, preserving the book thoroughly for shipping purposes.

"All alterations made from the original copy will be charged for at the rate of $1.30 per hour for linotype corrections, and $1.20 per hour for hand work.

"For the printing and binding of each tip, the same to be printed on 25x38-100 pound ENAMEL BOOK No. 1, the price will be $6.80.

"For each additional page over 536, the price will be $2.54 per page.

"For an additional 100 copies, the price will be $45.00.

"For each insert, similar to frontispiece, the price will be $6.80.

"We will agree to make zinc etchings for you for six cents—you to furnish the drawings or photographs for the same.

"We will also agree to furnish halftone cuts to you, of a suitable screen, at eighteen cents per square inch—you to furnish photographs that will give good results. This price does not include any retouching on photographs, should your photograph be imperfect.

"For printing 2,500 copies of your PRIMER; the same to contain sixteen pages and cover; trim size 6x9; cover to be printed on first page only; subject matter to be taken from the large report; printed on 25x38-60 pound S. & S. C. book paper; to be bound by inserting and stapling through the cover; to be tied up in suitable bundles, we will charge you $40.85 F. O. B. our shipping room.

"It is understood that for the above price we are not to do any composition whatever on this pamphlet,—except the cover.

"Thanking you very kindly for your inquiry, and sincerely hoping to be favored with your orders, which will have our careful attention, we remain,

"Yours very truly,
"ROBERT SMITH PRINTING CO.,
"J. A. RUSSELL, Vice Pres."

Arrangements for securing one original and a carbon copy of all discussions, both of the Executive Committee meetings and those arising upon the floor of the convention were made with Mr. Charles F. Roberts of New Haven, who for a number of years past has been selected to act as official stenographer. The actual expense for this work in connection with the Toronto meeting was somewhat in excess of previous conventions owing to the inauguration of sectional sections, which naturally called for an extra reporter; the bid for stenographic work for the session of 1911 exceeded previous estimates by over $100.00.

The total disbursements made by this Association under the direction of the Committee on Publication for the past twelve months are summarized as follows:

C. F. Roberts, per contract	$313 55
Chairman Publication Committee	327 73
The Robert Smith Printing Co	2,402 11
Postage for mailing reports	446 71
Total	$3,490 10

As the edition called for supplying 1,700 copies, the average price per volume approximated $2.00, a figure which somewhat exceeds that for previous reports, and which resulted through several circumstances which it is proper to call to your attention: First, through the increased size of the volume, owing to the greater number of papers made possible through the inauguration of sectional meetings; second, through the publication of an appendix is the shape of the report of the Association of College Faculties and Examining Boards of North America; third, the extra cost for stenographic hire already referred to; fourth, and, lastly, through a general increase of twenty per cent in the publisher's estimate as the result of an advance in the cost of labor.

All contributions to the program of the Toronto meeting were printed, with one exception, which paper was sent to the author for revision but was neither acknowledged nor returned. The principal discussions upon all papers presented during the meeting, and debates upon the floor, were mailed to the participant together with appended letter:

"Dear Sir:

"Enclosed you will please find some pages of the elongated report submitted from Stenographer Roberts. I will ask you to look them over with as

much dispatch as possible and carefully correct them, leaving them in such shape as you may desire to have them published in the proceedings of the annual report, should the remarks be used.

"The regulation for this work is that a party debating upon a given subject or paper be allowed two days for correction and revision of his remarks, exclusive of the time consumed in transit from and to the Chairman's office. Will you kindly use your utmost endeavors to comply with this regulation, and thus aid me in hastening the work, which is already in printing?

"Your very truly,
"R. P. LYMAN, Chairman."

This practice undoubtedly added to the value of the report but unquestionably tended, to some extent at least, to delay publication, for members do not exercise sufficient care or appear to realize the necessity of prompt compliance with stipulations similar to the above.

Your Committee wish to make public acknowledgment of a valued loan of a halftone plate of the officers of the Association. It was used in the manufacture of the frontispiece in the 1911 report and was the property of the American Veterinary Review.

As the members have undoubtedly noticed, the report this year greatly exceeds in volume that of any former year in the history of the Association. The editorial work which this has imposed upon your Committee has, in consequence, been greatly increased. In compiling the present book it has involved close reading and examination of approximately three thousand pages of manuscript or printed copy and has required an immense amount of time on the part of the Chairman of the Committee. May we, therefore, in this connection, express the hope that this work has been performed to the satisfaction of the members of the Association and has been found in all respects helpful in the work which we have in hand.

From the nature of the editorial work required in the preparation of our annual report, it cannot very well be divided among the other members of the Committee hence must of necessity be worked out by the Chairman.

The present incumbent, after several years' experience with publishing the annual proceedings, and likewise with serving the Association in the capacity of Secretary, has become convinced that the best interests of the Association will be subserved by the amalgamation of the office of secretary and duties imposed upon the Committee on Publication. This it would seem can be

well accomplished by raising the salary of the Secretary to, at least, $1,000.00 per annum and thus providing a sufficient fund to warrant the employment of a private stenographer by him. Such a change would increase our present expense but little; the income seems to warrant the inauguration of such a measure and your Chairman believes that material benefit would result to the Association.

Another matter that we wish to ask the Association to consider has especial reference to the good name of the Association. We refer to the adoption of measures that will insure prompt payment of obligations of the Association made through the regularly appointed officers of the organization. We speak of this for the reason that our contract for publishing the proceedings of 1911 called for payment of the account upon acceptance and delivery. The report for the past year was distributed by the publishers during the month of January and should have been paid for very soon thereafter. Your Chairman regrets to report that he received a series of letters from the publishers exposing the fact that the account remained unsettled as late as July 15, 1912, although there appeared to be sufficient funds on hand when the publishers account was approved.

Such a condition should be avoided, for if continued, as has been the case during the past two years, it will develop a condition which will be very difficult to overcome. This state of affairs had its origin through circumstances over which the present officers of the Association are in no way to blame, and was discovered by myself at the time of assuming the duties of the secretaryship. At that time was found to exist a deficiency of about $1,800, and although that deficit was wiped out and the Association has been altogether capable since then, of paying its obligations, the practice has remained of making use of funds accumulating for the year in advance in order to defray the current expenses for the preceding year. In order to overcome this difficulty in the future, your Chairman would recommend that the Treasurer be instructed to set aside from the funds of the Association an amount of say $500 annually for a period of four years, and whenever the unappropriated funds in the treasury are insufficient to pay for publishing our proceedings, or meeting immediate requirements, that the balance be made up from this fund, and the amount so expended be returned to the fund as soon as collected. If this plan is adopted, and the

money set apart in this fund is wisely invested, your Committee believes that the earnings of such fund, in the way of interest, would soon make it unnecessary to defer any of the money of the Association for this purpose, and there would always be a fund on hand sufficient to guarantee the payment of the bill for publishing our annual proceedings, which is the largest account our Association has to settle during the year.

Mr. C. F. Roberts, of New Haven, received the unanimous endorsement of your Committee as official stenographer for the present convention and has been retained under the following specifications:

"First. An attendance fee of $10 per day for each day that my services are required at Indianapolis.

"Second. A travelling allowance of $25.00.

"Third. I am to furnish two copies of the proceedings reported by me at fifteen cents per folio of one hundred words.

"Fourth. An allowance by the Association of the actual cost of such assistants as may be necessary to do the work required or called for by the program due to the holding of sectional meetings, or otherwise as may be necessary.

"Fifth. That the two copies of the report called for be delivered, one to the secretary, and the other to the chairman of the Committee on Publication not later than forty days after the close of the meeting.

"Sixth. That if a transcript of the proceedings of the Executive Committee is required, two copies of the same are to be furnished at fifteen cents per folio.

"Thanking you very much for this opportunity to accept your proposition, which I hereby do as above, and with high personal regards and good wishes to yourself and other friends on the Committee,

"Very truly yours,

"CHAS. F. ROBERTS."

In submitting this report, we take opportunity to express our appreciation of the continued cooperation received from the members of the Association.

REPORT OF COMMITTEE ON NECROLOGY.

W. H. Dalrymple, *Chairman*.

A. T. Peters, B. F. Kaupp,
Paul Juckniess, Thomas Thacker.

Your Committee on Necrology reports, with much regret, that during the past year, the following members of this Association,

and other members of the profession, have, through death, been taken from our midst, as, also, at least, one most prominent foreign member of the medical profession who was quite a friend to veterinary science:

JAMES H. KELLY, V. S.

Dr. James H. Kelly died at his home in New Haven, Connecticut, October 1, 1911, in his fifty-fourth year, a victim to glanders after fifteen days of suffering.

Dr. Kelly was born in Waterbury, Connecticut, December 25, 1857, was graduated from the New York College of Veterinary Surgeons in 1893, and since then practiced his profession in New Haven up to the time of his death. He was veterinarian to the fire and street departments of that city and had a large clientele in his private practice; was a member of this Association, and of the Connecticut veterinary medical association, having held, at one time or another, nearly every office in the latter society.

V. L. JAMES, V. S.

Dr. James died at his home in Middlefield, Connecticut, August, 1911, in his seventy-first year. The doctor was a highly respected citizen, and until his retirement from active practice was located in Cooperstown, New York. He was on the "Honor Roll" of this Association.

WILLIAM DANA CRITCHERSON, M. D., D. V. S.

Dr. Critcherson was born in Westerly, Rhode Island, September 11, 1858, and died suddenly, of cerebral apoplexy, in his native town, April 8, 1912.

Dr. Critcherson graduated from the American Veterinary College, New York, in 1883, and in 1888, from the medical department of the university of the city of New York with the degree of "M. D." He joined this Association in 1883, and was on the "Honor Roll" at the time of his death.

Dr. Critcherson was an active member, and had held offices in the veterinary medical association of New York City. He was a prominent Mason, and was buried with Masonic service at Woodlawn cemetery, New York City, April 11, 1912.

C. W. JOHNSON, D.V.S.

Dr. Johnson died, December 29, 1911, in the army hospital, St. Elizabeth, Washington, after an enviable reputation in the public service. After graduating from the Chicago Veterinary College, in 1887, and a short time spent in private practice in northern Illinois, Dr. Johnson entered the service of the bureau of animal industry, in which he continued for ten years, serving in Omaha and Chicago. Upon the reorganization of the army, subsequent to the Spanish-American war, Dr. Johnson was transferred to the subsistence department of the army at Chicago, where he continued in service, almost exclusively, until the time of his death, making his term of government service, in all, about twenty years. He was a member of this Association.

Dr. Johnson was an unfortunate victim of our present inadequate system in connection with the army veterinary service.

N. P. WHITMORE, M.D.C.

Dr. Whitmore died at the Brokaw hospital, Bloomington, Illinois, where he had been removed for treatment. He became infected while in the discharge of his professional duties, and succumbed to his ailment at the age of forty-four. He was an industrious and successful practitioner, and was regular in his attendance at the meetings of this Association as well as those of the Illinois state veterinary medical association.

ROBERTSON MUIR, M.R.C.V.S.

Dr. Robertson Muir died at Grand Rapids, Michigan, August 6, 1912.

Dr. Muir was born in Glasgow, Scotland, July 26, 1852. He received his veterinary education at the Glasgow Veterinary College and received the diploma of the Royal College of Veterinary Surgeons, England, April 17, 1875.

The doctor practiced in Scotland and Ireland for ten years, and in 1885 came to the United States, locating in Union City and later removing to Jackson, Michigan. Later he went to Bowling Green, Kentucky, where he was made state veterinarian. He then moved to Grand Rapids, Michigan, where he practiced for seventeen years.

Dr. Muir was a member of this Association, and also of the

Michigan state veterinary medical association; and at the time of his death, was a member of the faculty of the Grand Rapids Veterinary College. The doctor was a man of most amiable disposition, and was liked by every one who knew him.

GEO. F. McGUIRE, M.D.C.

Dr. George F. McGuire died at his home in Hartford, Connecticut, April 12, 1911, of valvular disease of the heart, and complications. Dr. McGuire was a graduate of the Chicago Veterinary College, of the class of 1894, and had been practicing since that time at New Britain, Connecticut, where he was associated, at the time of his death, with Dr. B. D. Radcliffe, under the firm name of "McGuire & Radcliffe."

JOHN OLIVER GEORGE, A.B., A.M., D.V.S.

Dr. John Oliver George died at his home in Camden, New Jersey, of heart disease, about the middle of October last, in his fiftieth year. Dr. George was a graduate of the American Veterinary College, 1894.

The Doctor was a native of Northampton County, Pennsylvania. In his early years he was a regularly ordained minister, occupying pulpits in Central Pennsylvania. After receiving his veterinary degree, at the age of thirty-three, he devoted himself to the practice of veterinary medicine, besides serving as food and drug inspector from 1901 to 1907.

NATHAN M. DRAKE, PH.G., D.V.S.

Dr. Nathan M. Drake, of Philadelphia, Pennsylvania, died of cirrhosis of the liver, February 26, 1912.

Dr. Drake had been practicing in Philadelphia for more than twenty-one years. Prior to entering the veterinary profession he had been a practicing pharmacist for over twenty years. He graduated from the American Veterinary College in 1890, and after one year's practice in Brooklyn, moved to Philadelphia and continued in active professional work until a few weeks before his death.

Dr. Drake was born in New Jersey, in 1855, and was in his fifty-seventh year.

ALBERT T. LEACH, M.D.V.

Dr. Albert T. Leach died at the home of his parents, in Somerville, Tennessee, May 21, 1912.

Dr. Leach was born in Somerville, December 21, 1881, and was educated in the public schools of that place, and the Branham and Hughes school of Spring Hill, Tenn. He graduated from the McKillip Veterinary College in 1909, receiving the degree of M. D. V.

The Doctor was overtaken by ill health which resulted in his untimely death at the premature age of thirty years.

CHARLES RADCLIFFE FAIRCHILD, D.V.M.

Dr. Charles Radcliffe Fairchild met an accidental death by being struck by a New York Central train at Main Street crossing, Bergen, New York, on the 29th of February last, in his twenty-sixth year.

Dr. Fairchild was born in Binghamton, New York, March 25, 1886. He entered the New York State Veterinary College, Cornell University, in 1907, and graduated in 1910.

Dr. Fairchild went to Bergen, New York, in the fall of 1910, where he practiced until the time of his death.

JOSEPH LISTER, M.B., F.R.C.S. (ENG.)

The Right Honorable Lord Lister died on February 11, 1912, at Walmer, England, from an attack of pneumonia, in his eighty-fifth year. He was born at Upton, in the county of Essex, England, in 1827, his father, Joseph Jackson Lister, F. R. S., being the inventor of the achromatic microscope. Lord Lister became M. B. at the London University in 1852, and in the same year took the F. R. C. S. (Eng.).

About 1856, Lister was appointed assistant surgeon to the Edinburgh Royal Infirmary, and in 1860, to the chair of surgery in the University of Glasgow. He had already contributed a series of important papers to the Royal Society, and in 1860 was elected a fellow. In 1863 he was appointed by the society as Croonian lecturer, and selected as his subject "The Coagulation of the Blood." About the same time he was a contributor of the articles on "Anesthetics" and on "Amputation" to "Holmes' System of Surgery," and had written other papers of very considerable merit.

To quote from the VETERINARY NEWS (London): "In the early sixties Lister became acquainted with the work of Pasteur, whose two great hypotheses—that putrefaction is caused by the agency of living germs, and that these germs are not spontaneously generated—Lister made his own and converted to unthought-of uses, with what results are well known, not only to the whole medical profession, but also to the whole civilized world. Focussing his "giant intellect upon the one great object, how to protect wounds from germs of inflammation, he devised the carbolic spray and carbolic gauze, or Listerian bandage, as it was then called."

"The effects upon surgical mortality were striking and immediate, no such curative results having been previously obtained. In consequence, operations of much greater magnitude were undertaken with confidence by surgeons which formerly none would have dared to perform. The system soon spread, and was speedily taken up in Germany, as well as in this country (Great Britain)."

"Another great advance in surgical art is also associated with Lister's name—the use of the absorbable catgut ligature, which he introduced as a substitute for the silken or flax thread hitherto exclusively used."

"The work which had been commenced in Glasgow was transferred to Edinburgh in 1869, Lister in that year succeeding his father-in-law, Professor Syme, in the chair of clinical surgery in the University of the last named city." * * * "In 1877 Lister was made professor of clinical surgery at King's College, London, a position which he held until 1893, when his work was practically done, and the splendid service which he had rendered to mankind could no longer be questioned or concealed. " * * * "The honors that awaited him were, perhaps, of little importance compared to his high services, but they were never more justly bestowed. On Mr. Gladstone's recommendation he was, in 1883, made a baronet, and in 1897 was raised to the peerage. In 1902 he was appointed a member of the newly-instituted Order of Merit, as well as a privy councillor. From 1895 to 1900 he was president of the Royal Society. He was sergeant-surgeon to Queen Victoria and to King Edward, and had been president of the British association for the advancement of science. His other scientific distinctions would require more than a column for their mere enumeration."

But we, as veterinarians, should not forget, that, while Lister's

great and beneficent work was done mainly in behalf of the medical profession and humanity, the veterinary profession and the lower creatures have also shared in his wonderful achievements.

And, withal, this great man was, admittedly, a true friend of the profession which this Association represents.

WHEREAS: It has pleased the Almighty to call from our midst to other spheres of activity our friends, co-workers and fellow members, Doctors James H. Kelly, V. L. James, William D. Critcherson, C. W. Johnson, N. P. Whitmore, Robertson Muir, Geo. P. McGuire, John O. George, Nathan M. Drake, Albert T. Leach, Charles R. Fairchild, and Joseph Lister, M. D., and

WHEREAS: It seems fitting that this Association record its feeling of grief and deep regret at their loss; therefore, be it

Resolved: That in the death of these friends and associates, this Association, and each individual member of it, deplores the loss of friends and co-workers in the uplift of the veterinary profession; and be it further

Resolved: That we, as an association, extend to the family of each of the departed the assurance of our heartfelt sympathy and condolence, in our common bereavement, and that a copy of these resolutions be spread upon our records.

REPORT OF COMMITTEE ON RESOLUTIONS.

S. STEWART, *Chairman*.

A. S. COOLEY, A. H. BAKER,
D. F. FOX, W. L. WILLIAMS.

FEDERAL LICENSING SYSTEM.

WHEREAS: Recent changes in state boards, in some of our states, strongly indicate the dangers that confront our profession in either advancing or maintaining fairly high standards already established; therefore be it

Resolved: That the Committee on Legislation will continue their consideration and efforts to establish a federal licensing system in the United States.

COURSES IN AGRICULTURAL COLLEGES.

WHEREAS: The veterinary instruction given in agricultural colleges to students pursuing the year agriculture courses, varies materially in the several agricultural colleges, and

WHEREAS: Graduates of agricultural colleges may receive one year time credit in veterinary colleges, accredited by this Association, providing said graduates in agriculture have had sufficient veterinary science; therefore be it

Resolved: That the President appoint a committee to outline such sufficient veterinary science, and to recommend to agricultural colleges the extent and scope of veterinary science which this Association believes should be included in such agricultural courses.

COLLECTION OF HOG CHOLERA DATA.

WHEREAS: Hog cholera has become very prevalent throughout the United States and Canada, and

WHEREAS: Much difference of opinion prevails amongst those who are endeavoring to prevent its spread and to eradicate the disease; therefore be it

Resolved: That the Committee on Diseases collect and prepare scientific and practical data on the control of hog cholera to be submitted at our next meeting.

RETIRING OFFICERS AND COMMITTEES.

Resolved: That we sincerely thank the retiring officers and committees for their excellent and painstaking efforts in the administration of their various duties.

LOCAL COMMITTEE ON ARRANGEMENTS.

Resolved: That we highly commend the Local Committee on Arrangements for the very excellent arrangements provided for this meeting, especially for the extent and quality of clinics and that we hereby tender them the thanks of the Association for their generous entertainment.

REPORT OF THE COMMISSION FOR THE STUDY OF METHODS OF CONTROL OF BOVINE TUBERCULOSIS.

Rutherford, J. G., C. M. G., V. S., H. A. R. C. V. S., late Veterinary Director-General and Live Stock Commissioner of the Dominion of Canada, Calgary, Canada; *Chairman.*

Reynolds, M. H., D. V. M., Professor of Veterinary Science, College of Agriculture and Experiment Station, University of Minnesota, St. Anthony Park, St. Paul, Minn.; *Secretary.*

Edwards, Hon. W. C., Senator, Canadian Parliament, Ottawa, Canada.

Ferguson, J. J., B. S. A., head of the Animal Foods Branch, Swift & Co., Chicago, Ill.

Flavelle, J. W., LL. D., Governor, University of Toronto; President, William Davies Packing Co.; Toronto, Canada.

Hoard, Hon. W. D., ex-Governor of Wisconsin; Editor of Hoard's Dairyman; Fort Atkinson, Wis.

Hodgetts, Charles A., M. D., C. M., L. R. C. P., Chief Medical Adviser, Commission on Conservation for Canada, Ottawa, Canada.

Hurty, J. N., M. D., Secretary, State Board of Health of Indiana, Indianapolis, Ind.

Mohler, John R., A. M., V. M. D., Chief of the Pathologic Division, Bureau of Animal Industry, United States Department of Agriculture, Washington, D. C.; President American Veterinary Medical Association.

Moore, Veranus A., B. S., M. D., V. M. D., Director of the New York State Veterinary College, Cornell University, Ithaca, N. Y.

Ravenel Mazyck P., M. D., Professor of Bacteriology, University of Wisconsin, Madison, Wis.

Schroeder, E. C., M. D. V., Superintendent of Experiment Station, Bureau of Animal Industry, United States Department of Agriculture, Bethseda, Md.

Tomlinson, T. W., Secretary, American National Live Stock Association, Denver, Col.

Torrance, Frederick, B. A., D. V. S., late Director of the Faculty of Comparative Medicine, University of Manitoba; Veterinary Director-General, Ottawa, Canada.

Mr. President and Gentlemen:

I had the honor to present to the Association last year the report of the Commission for Study of Methods of Control of Bovine Tuberculosis, and that report gave you in complete detail what the Commission had done up to that time. The Commission has held only one meeting during the past year, and that during the present meeting of the American Veterinary Medical Association. It was felt after the deductions of the main report, and issuance of the special forms of treatise on bovine tuberculosis that until after further developments took place in regard to tuberculosis among cattle, it would be unnecessary and out of place for the Commission to expend money in meeting, as there seemed comparatively little that we could do. At the meeting which has just taken place here in Indianapolis, it was decided to communicate with the governments of the United States and Canada, asking them to take certain definite action relative to the registration

of herds known to be free from tuberculosis, with a special reference to dairy breeds of cattle, and I will read, with your permission, a letter drafted by the Committee, that it is proposed to send to the governments in question:

"The National Commission for the Study of Methods for the Control of Bovine Tuberculosis: After careful consideration we submit for your consideration the following: In view of the frequent occurrence of tuberculosis among dairy breeds of cattle, intelligent buyers of said cattle are reasonably demanding specific information which will help in their purchases, and those breeders who maintain herds free from tuberculosis readily sell their animals at enhanced prices, it is therefore the opinion of this Commission that the time has come when official recognition should be given to such healthy herds, not only because such herds will deserve recognition, but also for the guidance of purchasers and breeders. The Commission therefore respectfully recommends that the Honorable Secretary of Agriculture of the United States and the Honorary Magistrate of Agriculture for the Dominion of Canada, take such steps as may appear to them to be proper, necessary and expedient for the purpose of formulating regulations governing the issuance of certificates of health of such herds as are free from bovine tuberculosis, and to recommend the official record of such certificates. A herd to be officially recognized as a tuberculosis free herd shall be entirely free from any animal reacting to the tuberculin test as conducted by the veterinary official and approved by the respective departments of agriculture in the two countries."

I might say with reference to this recommendation that it is the intent that action to be taken by the respective departments of agriculture in the two countries shall be along lines somewhat similar to those now maintained in both countries with regard to the registration of pure bred dairy cattle with reference to yielding quality of milk in both the United States and Canada. In Ottawa, the work is carried on by a corps of inspectors operating under the direction of the live stock breeders, and the results of that work in enhancing the value to the breeder of the progeny of animals which have become entitled to the advanced registration has been so great that the owners are united in commending the work, and expressing a desire for its continuance.

It is felt by the Commission that the work which we have outlined, while it may take some little time to fully develop, will very

soon make itself felt. There are, as we all know, certain breeds of cattle which are much less liable to tuberculosis than others, and there is no question but what the breeders of any of these particular breeds will be very ready to take advantage of any opportunity of adding to their immunity in the way suggested. That will lead, of course, to some revolutionary changes in the methods pursued with reference to other breeds which are not so immune; the consequence will be, instead of there being as now, unfortunately, to some extent no means for having a herd tested, and its weakness exposed, the breeders and owners of such herds will find it necessary to secure a clean sheet as regards the existence of the disease among such animals, and the Commission feels that the application of this idea will in time prove highly beneficial towards distinguishing this disease among such herds.

It is not necessary for me to occupy your time further in regard to this matter except to say that the members of the Commission feel that they are not yet justified in altering their position in any way in regard to various methods of carrying out the test for tuberculosis. The members of the Commission feel that while an advance has been made in regard to some of the newer forms of testing, yet they are not justified by the experience, or by the results of such work which has been done in certain sections of the country relative to these new tests, to alter their position to the effect that subcutaneous injection is the only reliable and dependable form of administration.

Further than that, we might say that the matter of the further existence of the Commission is entirely in the hands of the American Veterinary Medical Association; they feel, however, that it might be desirable to continue the Commission as now constituted. You will observe by the bills which have been presented by the Commission on Bovine Tuberculosis to this Association that they have never been of a very serious or of a burdensome nature. From its inception and from the manner of its composition, its business has been conducted with very little expense to this Association, and that being the case, in view of the desirability of having ready a body which will be in effect, as it is in fact, ready to help the veterinary profession of America in regard to the study of this great question of bovine tuberculosis, it would be well to continue the Commission we think, for the present at least, and on the lines which it has been conducted up to now.

REPORT OF COMMITTEE ON VETERINARY COLLEGES.

TAIT BUTLER, *Chairman.*
M. H. REYNOLDS. G. W. DUNPHY.

To the Members of the American Veterinary Medical Association:

Gentlemen: Your Committee on Veterinary Colleges begs leave to submit the following report:

The Committee met at Chicago, Illinois, January 22, 1912, to formulate plans for carrying out the purposes of the Association. This preliminary meeting became especially necessary, because the Committee being a new one, there were no accepted precedents to follow.

After organizing the Committee, Tait Butler, Chairman, and M. H. Reynolds, Secretary, and formulating plans for work, the Chicago Veterinary College and the McKillip Veterinary College were visited and the work and equipment of these institutions looked into by the full membership of the Committee.

Owing to the limited funds available for this work, it was not possible for all the members of the Committee to visit all the veterinary colleges; moreover, the funds would not suffice to send even one member of the Committee to all of the colleges. For instance, to send one man to visit the three far western colleges and pay the expenses of the necessary preliminary meeting of the Committee in Chicago, would consume more than half our available funds.

In view of these facts, the Committee adopted the following plan for doing the work:

1. Dr. M. H. Reynolds visited the following colleges.

Kansas City Veterinary College.
St. Joseph Veterinary College.
Kansas State Agricultural College, Veterinary Department.
Iowa State College, Veterinary Department.
Grand Rapids Veterinary College.
University of Toronto, Ontario Veterinary College.

On his visit to the Iowa State College, Dr. Reynolds was accompanied and assisted by Drs. C. E. Stewart and Hal C. Simpson, President and Secretary respectively, of the Missouri Valley Veterinary Medical Association.

2. Dr. G. W. Dunphy visited the following colleges:

Ohio State University, College of Veterinary Medicine.
Cincinnati Veterinary College.
Indiana Veterinary College.
Terre Haute Veterinary College.
University of Pennsylvania, Veterinary Department.
New York-American Veterinary College.
New York State Veterinary College.
George Washington University, College of Veterinary Medicine.
United States College of Veterinary Surgeons.

3. Through the courtesy of Dr. A. D. Melvin, Chief of the United States bureau of animal industry and the efficient and kindly services of Drs. A. M. Farrington and R. W. Hickman, who constituted the veterinary college committee of the bureau of animal industry, our Committee was enabled to obtain a full report of the three far western veterinary colleges, namely, Colorado State College, Division of Veterinary Science; San Francisco Veterinary College and the State College of Washington, Veterinary Department.

The information regarding these colleges furnished the Committee by Drs. Farrington and Hickman was based on a list of questions and instructions furnished by our Committee and this list of questions and the report furnished are filed with this report as Exhibit A.

EXHIBIT A.

List of Questions Intended to Obtain Information For the Use of the American Veterinary Medical Association Regarding the Work of American Veterinary Colleges.

1—Name and location of institution.

2—Obtain and have sent to the Chairman of the Committee, catalogue or announcement, and all other printed matter, or advertisements which may have a bearing on the character and methods of the institution.

3—Is all instruction given in one building?
If in different buildings, different parts of the city, or in different cities, how does this division affect the work of the institution?

4—MATRICULATION.

(a) What is the standard or grade of matriculation or other qualifications for entrance?

(b) Dates, especially latest date, at which matriculation examinations are held and latest date at which students are admitted to regular classes during the session.

(c) What per cent of applicants fail on matriculation examination?

(d) On what basis are students admitted from other colleges?
1—Veterinary Colleges.
2—Medical Colleges.

3—Dental Colleges.
4—Pharmaceutical Colleges.
5—Agricultural Colleges.

5—FACULTY.

(a) How many veterinarians are on the faculty?
(b) Where and when did these veterinarians graduate?
(c) How much teaching is done by each veterinarian on the faculty?

6—CURRICULUM.

(a) List of subjects taught—daily time or class cards covering full work of entire session for all classes.
(b) Number and kinds of laboratories? How used? Character and extent of equipment? Evidences of regular and efficient use?
(c) Number and extent of clinics? Character and amount of material? Are clinics held at regular or irregular periods and is attendance on these clinics compulsory? Is proper use being made of material available?

7—LENGTH OF COURSE.

(a) Number of years? Length per year for each class exclusive of holidays?
(b) Length of vacations.
(c) What part of work of regular course is done at night?
(d) Is course graded?
(e) How often are rolls called?
(f) What practice is followed as regards written reviews, examination, quizzes, or other methods of ascertaining character of work being done during session?

8—GRADUATION.

(a) What is the basis or standard upon which diplomas are granted?
1—Per cent of attendance.
2—Per cent of perfect on examinations.
(b) How are final examinations conducted,—written, oral, practical?
(c) What per cent of students fail on the final examinations for diploma? What per cent fail on final examination of freshman and junior classes?
(d) What degree is conferred? What other certificates or diplomas are granted?
(e) What special or post-graduate courses are offered?
(f) At what dates are diplomas granted?

4. To assist the Chairman of the Committee in his inspection of that institution, Dr. George R. White was asked and kindly consented to furnish a report on the Alabama Polytechnic Institute, college of veterinary medicine. This report furnished by Dr. White was also based on a list of questions and instructions furnished by your Committee and these questions and the report will be filed with the Secretary together with this report as Exhibit B.

2. The full Committee, as previously stated, visited the Chicago Veterinary College and the McKillip Veterinary College.

The Committee, therefore, has investigated either directly or by sub-Committee, the latter being authorized by the terms of the Resolution instructing the President of the Association to appoint the Committee, the following veterinary colleges:

Alabama Polytechnic Institute, College of Veterninary Medicine.
Chicago Veterinary College.
Cincinnati Veterinary College.
Colorado State College, Division of Veterinary Science.
George Washington University, College of Veterinary Medicine.
Grand Rapids Veterinary College.
Indiana Veterinary College.
Iowa State College, Division of Veterinary Medicine.
Kansas City Veterinary College.
Kansas State Agricultural College, Veterinary Department.
McKillip Veterinary College.
New York-American Veterinary College.
New York State Veterinary College.
Ohio State University, College of Veterinary Medicine.
San Francisco Veterinary College.
St. Joseph Veterinary College.
State College of Washington, Veterinary Department.
Terre Haute Veterinary College.
United States College of Veterinary Surgeons.
University of Pennsylvania. Veterinary Department.
University of Toronto, Ontario Veterinary College.

Reports and data regarding all these colleges are filed with this report and marked Exhibits B to S.

Your Committee is pleased to report that the veterinary colleges of America show marked evidences of a purpose and ability to comply with the requirements for membership laid down in the By-Laws of this Association.

There is plainly manifest, not only a commendable spirit of progress, but also a desire to comply with our requirements. Your Committee interpreting its duty to be to furnish the fullest information possible under the circumstances, in addition to filing the above mentioned data with the Association, respectfully reports that it finds that the following colleges are complying with the By-Laws of this Association, in-so-far as said By-Laws define the qualifications of candidates for membership, as related to matriculation or entrance examinations, transfer of credits, length of course, graduation requirements and the number and eligibility

of veterinarians on their faculties, except as hereafter noted with reference to the Grand Rapids Veterinary College.

You are respectfully cited to Article VIII, paragraphs A., B. and C. of section 2 and section 3 of By-Laws.

Alabama Polytechnic Institute, College of Veterinary Medicine.
Chicago Veterinary College.
Cincinnati Veterinary College.
Colorado State College, Division of Veterinary Science.
George Washington University, College of Veterinary Medicine.
Grand Rapids Veterinary College.
Indiana Veterinary College.
Iowa State College, Division of Veterinary Medicine.
Kansas City Veterinary College.
Kansas State Agricultural College, Veterinary Department.
McKillip Veterinary College.
New York-American Veterinary College.
New York State Veterinary College.
Ohio State University, College of Veterinary Medicine.
San Francisco Veterinary College.
State College of Washington, Veterinary Department.
Terre Haute Veterinary College.
United States College of Veterinary Surgeons.
University of Pennsylvania, School of Veterinary Medicine.
University of Toronto, Ontario Veterinary College.

If the list of recognized colleges for 1911-1912, as published in our annual report includes all of the colleges whose graduates are eligible to membership in this Association, then the faculty of the Grand Rapids Veterinary College for 1911-1912 does not comply with the letter of our By-Laws requiring five veterinarians eligible to membership in this Association. This is true because of the seven veterinarians on the faculty four were graduates of the Detroit Veterinary College, or of the Grand Rapids Veterinary College for years not included in this list.

In view of the fact that the St. Joseph Veterinary College is not now applying for recognition by this Association, your Committee has not thought best to report in this connection upon its work. Careful investigation, however, was made of equipment, faculty, course, etc., and of the matriculation and work of the present freshman class (1911-1912). Complete data of our findings will be filed with this report as Exhibit O.

Your Committee deems it a duty incumbent upon it by virtue of the responsibilities imposed by its appointment for this work, to call attention of the Association to the following facts:

Probably the greatest defect in American veterinary colleges as now conducted is the low entrance requirements actually maintained by a number of them. Especially marked in many of the private colleges, but also probably existing in some state schools.

It is the opinion of your Committee after examining the questions asked applicants and the answers submitted by said applicants, that a very large majority of the private schools and at least one state school, while nominally attempting to comply with the letter of our By-Laws requiring the matriculation examination to be equal to the eighth grade of the public or grammar schools, are not actually living up to the spirit of this requirement.

In many cases, examined by this Committee, the questions were thought less difficult than necessary to fully comply with said requirement of this Association, but the most frequent and important failure to comply with the spirit of our requirements is that, in marking or grading the answers too great liberality or looseness exists. In fact, cases came to our attention where papers of applicants were marked upward and the applicants admitted that, by no sort of liberal construction could the grading be regarded as at all accurate or indicating a true measure of the qualification of the applicant. This is the greatest defect your Committee has found; namely a failure to make the questions as difficult as our regulations require and, in many cases, a still greater failure to grade the papers with anything approaching a strict regard to accuracy. Almost any sort of a standard which the Association may set might be nullified by such a loose and flexible method of grading the answers. But the colleges are keeping the questions asked applicants and the answers thereto and these were offered freely for the inspection of your Committee, and we believe that when the attention of the colleges have been called to this shortcoming there will be less glaring and frequent defects of this nature.

The work of your Committee was very much hampered by the absence of any standard for judging the curricula of the colleges, laid in the By-Laws of our Association. Without some standard any work of such a Committee becomes entirely the result of the individual opinions and standards of the members of the Committee, which must of necessity vary from year to year.

Owing to the indefinite and incomplete statement of requirements now contained in our By-Laws the colleges are without any definite standard to which they may aim, and we are without a

sufficiently definite measure by which to judge of their compliance with what should be demanded of them. For instance, a college might comply with all the demands of our By-Laws, as to length of course, and still give very much less instruction on major subjects than we would deem adequate, and very much less on all subjects taken as a whole, than other colleges are giving in a course of the same prescribed length. Indeed, in-so-far as our By-Laws now specifically require, a college might fail entirely to teach any important subject and still comply with our By-Laws. Moreover a school might have five veterinarians on its faculty and one of these give half the instruction. In view of these facts and in consideration of the further fact, that the colleges are practically all aiming to comply with the specific requirements set down by Circular 150 of the United States bureau of animal industry, entitled, "Regulations Governing Entrance to the Veterinary Inspector Examinations," therefore, your Committee respectfully recommends that the regulations numbers one to nineteen inclusive of said circular 150 be adopted and substituted by this Association for the first sentence of paragraph A., and paragraphs B. & C., of section 2, and for section 3, of Article VIII of our By-Laws.

REGULATION I.—Matriculation:

1. A matriculation examination shall be adopted by each veterinary college, the minimum requirements of which shall be equivalent to the second-grade examination as published in the United States Civil Service Manual of Examinations, supplemented by United States history and geography of the United States and its possessions. Such examination will therefore comprise:

1. Spelling.
2. Arithmetic.
3. Letter writing.
4. Penmanship.
5. Copying from plain copy.
6. United States history.
7. Geography of the United States and its possessions.

2. An applicant having a diploma from a recognized college or a normal or high school shall be eligible for admission to a veterinary college without examination.

REGULATION II.—Dates of holding matriculation examination:

The entrance examination shall be conducted on one or more specifically advertised dates under the supervision of the dean, director, or, in the case of state institutions, by the official examining board. The last entrance examination shall be held not later than fifteen days subsequent to the

advertised annual opening of the college year, and no time credit shall be allowed to students admitted after that date.

REGULATION III.—Filing of matriculation examination papers:

The questions and answers of both successful and unsuccessful applicants shall be kept on file by the institution for at least five years subsequent to the examination of the applicants.

REGULATION IV.—Grading of matriculation examination papers:

Applicants shall be graded upon a basis of 100 per cent, and a grade of not less than 70 per cent shall qualify for admission.

REGULATION V.—Certificate of matriculation examination:

Any person applying for admittance to the freshman class or for advanced standing in a veterinary college shall present before being enrolled a certificate showing that he has passed the matriculation examination required by these regulations, and in no case shall he be admitted without such certificate.

REGULATION VI.—Subjects constituting course of Instruction:

The appended list of subjects shall constitute the course of instruction required as a minimum for veterinary colleges. Those numerically indicated shall be known as the major subjects, and those designated by letters shall be under the direction of the professors in charge of the allied major subjects.

1. Anatomy:
   (a) Histology (veterinary).
   (b) Zoology (veterinary).
   (c) Embryology.
2. Physiology:
   (a) Principles of nutrition.
   (b) Hygiene.
   (c) Animal locomotion.
3. Zootechnics:
   (a) Breeds and breeding.
   (b) Judging.
   (c) Feeds and feeding.
   (d) Dairy inspection.
   (e) Jurisprudence.
4. Chemistry:
   (a) Elementary physics.
   (b) Physiologic chemistry—analysis of milk, urine, etc.
5. Materia medica:
   (a) Botany (medical).
   (b) Pharmacy.
   (c) Toxicology.
6. Pathology:
   (a) Bacteriology.
   (b) Parasitology.

(c) Post-mortem examination.
(d) Meat inspection.
(e) Laboratory diagnosis.

7. Practice of comparative medicine:
(a) Diagnostic methods and clinics.
(b) Therapeutics.
(c) Control of infective diseases.

8. Surgery:
(a) Surgical diagnosis and clinics.
(b) Surgical restraint.
(c) Soundness.
(d) Lameness.
(e) Shoeing and balancing.
(f) Dentistry.
(g) Obstetrics.

REGULATION VII.—Length of course:

The course of instruction when given during the day shall cover a period of three years of not less than six and one-half months in each year, exclusive of final examinations and holidays; and this course of instruction shall have as a minimum 150 days of actual teaching in each year and a minimum of 3,000 actual teaching hours for the entire three years. The course of instruction when given at night (after 6 p. m.) shall cover a period of three years of not less than eight and one-half months in each year, exclusive of final examinations and holidays. Such course of night instruction shall have as a minimum 200 days of actual teaching in each year, and a minimum of 3,000 actual teaching hours for the entire three years, including at least 150 hours of practical clinical instruction, which shall be given in the daytime.

REGULATION VIII.—Minimum number of hours in course:

Anatomy, major subjects:

Lectures	200	
Laboratory	300	
	——	500
Histology—		
Lectures	40	
Laboratory	100	
	——	140
Embryology—		
Lectures	10	
Laboratory	20	
	——	30
Zoology—		
Lectures	20	
Laboratory	20	
	——	40
Total for subject		710

Physiology, major subject:		
Lectures	80	
Laboratory	20	
		100
Principles of nutrition	10	
Hygiene	10	
Animal locomotion	5	
		25
Total for subject		125
Zootechnics, major subject:		
Breeds and breeding		30
Judging		30
Feeds and feeding		30
Dairy inspection		10
Jurisprudence		10
Total for subject		110
Chemistry, major subject:		
Lectures	50	
Laboratory	150	
		200
Physics (elementary)		20
Physiologic chemistry—		
Urine analysis	10	
Milk analysis	10	
		20
Total for subject		240
Materia medica, major subject:		
Lectures		70
Pharmacy, lectures, and laboratory		50
Botany		30
Toxicology		10
Total for subject		160
Pathology, major subject:		
Lectures	40	
Laboratory	100	
		140
Bacteriology—		
Lectures	20	
Laboratory	90	
		110

Parasitology—		
Lectures	50	
Laboratory	10	
		60
Post-mortem examination		10
Meat inspection		50
Laboratory diagnosis		50
Total for subject		420

Practice of comparative medicine, major subject:		
Lectures		250
Diagnostic methods and clinics		300
Therapeutics		100
Control of infective diseases		25
Total for subject		675

Surgery, major subject:		
Lectures	100	
Surgical exercises	80	
		180
Surgical diagnosis and clinics		200
Surgical restraint		30
Soundness		20
Lameness		50
Shoeing and balancing		10
Dentistry (lectures)		20
Obstetrics		50
Total for subject		560

Recapitulation.

Total hours for anatomy group	710
Total hours for physiology group	125
Total hours for zootechnics group	110
Total hours for chemistry group	240
Total hours for materia medica group	160
Total hours for pathology group	420
Total hours for practice of comparative medicine group	675
Total hours for surgery group	560
Total hours, three-year course	3,000

REGULATION IX.—Transfer of time from one subject to another of same group:

An elasticity may be allowed in the apportionment of the time to the different subjects (or their divisions) under each group to the extent

that not more than 25 per cent may be omitted from the time of any one subject, providing this deducted time be added to some other subject or subjects in the same group.

REGULATION X.—Grading of course:

The course shall be graded in such manner as to avoid unnecessary repetition of lectures or instruction to the same student. For example, a student, while freshman, should be required to complete a definitely outlined course in such subjects as anatomy, histology, chemistry, etc. When advanced to the junior class he should either drop the studies of his freshman year and take up new work, or he may continue the same subject; for example, anatomy, along advanced lines of instruction.

REGULATION XI.—Number of veterinarians:

On the faculty of every veterinary college there shall be at least five graduate veterinarians from accredited veterinary colleges teaching major subjects, each of whom shall have had not less than one year's additional training in some accredited veterinary college or three years' experience in teaching or in practicing veterinary science subsequent to graduation from an accredited veterinary college.

REGULATION XII.—Qualifications of teaching veterinarians:

Not more than three of the five veterinarians in charge of major subjects on each college faculty shall be graduates of any one veterinary college, unless they have had at least one year's additional training in another accredited veterinary college.

REGULATION XIII.—Subjects taught by veterinarians:

The five veterinarians on the faculty of each veterinary college shall have charge of the following major subjects: (1) Anatomy; (2) Practice of Comparative Medicine; (3) Surgery, and any two of the following three subjects: Pathology, Materia Medica, and Physiology.

REGULATION XIV.—Evidence of attendance:

At the end of the college year each student is entitled to and shall receive a written statement giving the length of time spent in each study during the session and the grade received therein. This statement, or definite evidence of credit, shall be exacted from a student before he is given advanced standing in any veterinary college.

REGULATION XV.—Transfer of students:

A student transferring from one accredited veterinary college to another accredited veterinary college shall be given credit only for such time and courses (lectures and laboratory) as he has successfully completed in the institution previously attended. No one of the colleges herein enumerated shall give credit to any student for any work done at colleges not included in this list.

REGULATION XVI.—Applicants from colleges not veterinary.

1. An applicant who has successfully completed at least two years' work in a reputable college of human medicine, dentistry, pharmacy, or agriculture, and who brings an official and explicit certificate describing his course of study and scholarship, and also a certificate of honorable

dismissal, shall not be admitted to advanced classes or standing in a veterinary college except as otherwise provided in section 2 of this regulation, but may be given credit for such subjects as have been successfully completed in such colleges if, in the subjects for which credit is sought, said colleges maintain a standard of instruction similar and equal to the minimum standard of requirements established by these regulations.

2. An applicant from a state agricultural college having upon its faculty one or more graduate veterinarians giving a special course in veterinary science may be given a time credit of one year, providing he has a certificate from the college authorities that he has successfully completed at least 1,200 hours in studies as follows:

Anatomy:		
Lectures	200	
Laboratory	300	
	——	500
Histology:		
Lectures	40	
Laboratory	100	
	——	140
Embryology:		
Lectures	10	
Laboratory	20	
	——	30
Zoology:		
Lectures	20	
Laboratory	20	
	——	40
Physiology:		
Lectures	80	
Laboratory	20	
Principles of nutrition	10	
Hygiene	10	
Animal locomotion	5	
	——	125
Zootechnics:		
Breeds and breeding	30	
Judging	30	
Feeds and feeding	30	
Dairy inspection	10	
	——	100
Chemistry:		
Lectures	50	
Laboratory	150	
Physics (elementary)	20	
Milk analysis	10	
	——	230
Botany		35
Total hours preveterinary course		1,200

REGULATION XVII.—Agricultural and medical college graduates:

1. A graduate of the regular four-year agricultural course in an agricultural college having upon its faculty a qualified veterinarian giving a regular course of instruction in veterinary science may be given a time credit of one year, but this credit shall apply only to such subjects as he has successfully completed, provided the course of instruction in said agricultural college, in the subjects for which credit is sought, is similar and equal to the minimum standard of requirements in the course indicated in these regulations.

2. A graduate of a reputable college of human medicine on presentation of a diploma from such college may be given a time credit of one year, but this credit shall apply only to such subjects as he has successfully passed, provided the course of instruction in said medical college in the subjects for which credit is sought is similar and equal to the minimum standard of requirements in the course indicated in these regulations.

REGULATION XVIII.—One graduations period only.

No veterinary college shall have more than one graduation period yearly, nor shall diplomas be issued except at the close of the regular college year.

REGULATION XIX.—Requirements for graduation.

1. A candidate for graduation shall have attained the age of 21 years and attended three full college years in a veterinary college herein recognized (except as otherwise provided in Regulations XVI and XVII); the last year of attendance must have been at the college to which he applies for graduation.

2. He must have successfully completed the course of study and passed all the final examinations in the subjects indicated in these regulations.

3. If he fails to pass satisfactorily in subjects representing in time 25 per cent or more of his senior year, these subjects must again be taken in full with a succeeding class before he can be graduated.

The colleges are now nearly all striving to comply with these regulations and their adoption will give the Association a definite minimum standard to which it can demand that the colleges comply without imposing any additional obligations on them.

Your Committee feels it would not be doing its full duty to the colleges and to this Association, if it failed to make suggestions which occur to it, for the strengthening of certain of the present defects in some of the colleges and, therefore, there will be filed with the Secretary of the Association friendly suggestions for the strengthening of the work of these colleges. These suggestions are made in the interest of progress and for the betterment of veterinary education and are submitted as Exhibit T., of this report. The Committee recommends that these suggestions be

transmitted by private letter to the deans of the respective colleges to which they refer, by the Secretary of this Association.

In concluding this report the Committee wishes to express its special appreciation and thanks for the valuable aid rendered it by Doctors Melvin, Farrington and Hickman and especially to Dr. A. M. Farrington who at our request sat with us in our deliberations and rendered us valuable assistance; to Dr. George R. White for his report on the Alabama Polytechnic Institute, College of Veterinary Medicine and to Doctors C. E. Stewart and Hal C. Simpson for their helpful work in the inspection of the Iowa State College, veterinary department, in company with Dr. Reynolds of this Committee, and to all the veterinary colleges for their uniform courtesy and ready willingness to assist us in our work.

We recommend that this report and the exhibits attached thereto be filed with the Secretary of this Association for the use of the Association, its Executive Committee, and the members of any future committee on veterinary colleges.

DISCUSSION.

DR. BUTLER: You will notice that our By-Laws make no mention of any courses excepting length of courses which the colleges should conduct. If you will refer to Article VIII, section 3 of our By-Laws, you will see what it says on this question.

I want to call attention to the fact that the faculty of the Grand Rapids Veterinary College for the year 1911-1912 does not comply with the letter of our By-Laws regarding the necessity of having five veterinarians on the faculty that are eligible to membership in this Association. If the list of recognized colleges for 1911-1912 as published in our annual report for 1911 is to be taken as the standard, then there might be some question as to the eligibility for membership in this Association of those who graduated recently from that college. That is true, because if I mistake not four veterinarians upon the faculty of that school are graduates of the Detroit Veterinary College, or Grand Rapids Veterinary College, during those years not included on the recognized list. The other three faculty members were graduated from schools that are included in our list. To make it a little more plain, the Detroit Veterinary College was not included in the eligible list of this Association in 1911-1912, yet, in order to make five veterinarians eligible to membership in this Association you would be obliged to count graduates of that institution, or else count graduates of the Grand Rapids School for those years in which we have not recognized that school.

You will note that the St. Joseph Veterinary College was not included in this list of colleges that were complying with our requirements, but that it was included in the list which we inspected, even though, so far as I know it has not applied for recognition at this time.

Dr. Mayo: Mr. Chairman, I move that the report of the Committee be received, and that their recommendations be adopted. Seconded.

Dr. G. R. White: Mr. President, is it not necessary that the motion include provisions to continue this Committee? There is no doubt, gentlemen, but what this Committee has been of great value to the veterinary profession of this country, and the Association's money has been well spent. I think the thanks of this Association are due to this Special Committee on College Investigation, and, in my opinion, it should be continued for at least one more year with a special appropriation to cover expenses of the committee.

Dr. W. Horace Hoskins: Mr. President, I do not object to the motion or to Dr. White's suggestions but would like to know how much of this report is to be published with our proceedings, or otherwise made accessible to the members of this Association. Many of us, undoubtedly, would like to examine it. I am extremely anxious and hold that it is my right to know the standing and what criticism there may be of the school for which I am to a certain degree responsible, and have no doubt but that every member of any teaching faculty is equally anxious. I notice that Dr. Butler in making his report stated that the data collected was to be on file and it seems to me that it would be a mistake not to publish that data in our proceedings where all schedules would be accessible to every veterinary school in this country, the graduates of which are eligible to membership in this organization; moreover, unless we know what the outcome of this investigation is, to which the Committee has devoted a great deal of time, the report will be of comparatively little value to the Association.

Dr. Mayo: I am not connected, Mr. Chairman, with any veterinary school, and my impression from listening to the report of this Committee was that the object for which it was appointed has been fulfilled, namely, to see whether these schools have been complying with the regulations of this Association. The Committee, in its wisdom has gone a little further, and have made some suggestions to be conveyed to these different institutions whereby they can strengthen their courses and suggests a way to do it without stirring up any strife in these institutions, or bringing turmoil into this Association. I believe that when the Secretary or Chairman of the Committee recommended that this data which they have collected should be filed with the Association, and when I made the motion that these recommendations of the Committee as contained in the report and the suggestions of the Committee be adopted, there was but one object in view, namely, to fix it so that this information shall be given to these institutions helping them in that way without making any trouble, at the same time we endorse the report of the Committee which has gone as far as this Association can go.

Dr. Butler: I want to say, Mr. Chairman, for the information of Dr. Hoskins that this data which we propose to file relating to each college consists of material altogether too voluminous to publish, including our notes taken in answer to the scheduled questions, of catalogues, time cards, and every other source of information that we could obtain. The Committee has no wish to hide these conclusions, and as your Chairman,

I am ready to answer any question so far as our investigation will permit us regarding any institution, and to the extent which our Constitution and By-Laws warrant.

DR. HOSKINS: We have no objection to that. I quite agree that that would be the best plan to pursue, but what I am after, is to be able to get hold of this material. I do want all of the other matter as collected to be accessible.

DR. BUTLER: The Committee thought that the material, notes and all of this other data could be filed with the Secretary of the Association, with the Librarian, or with any other member you may designate, and that then anybody interested could examine what we have filed. We do not believe it is practical to print it, or to take any other course regarding the material collected, than what the Committee have recommended. If you will read the report you will find as an illustration of what might happen under our Constitution, that while a specific college complied with the requirements, it is not in compliance with our rules and regulations which would permit us to admit their graduates and, moreover, take another instance; if we consider the number of hours required, all of the colleges are substantially the same. Taking three thousand hours as a standard for each of the colleges, you will find instances of colleges which are falling down to a considerable percentage short of that, and yet complying with the letter but, I think, not the spirit of our By-Laws. I would like it, if we could make our By-Laws a little more specific upon that point, so that we could get a better application.

DR. E. B. ACKERMAN: I think the Association is entitled to have the deductions that this Committee has made. For instance, it must have appeared from all of this detail and examination which the Committee has carried on, that College A, for instance, was deficient in one thing, while College B, was deficient in something else. The Committee must have reached some conclusions about those matters, and should have those deductions and conclusions in their report.

DR. N. S. MAYO: As I understand the report of the Committee, that is exactly what they propose to convey to those colleges which have been found deficient.

DR. H. D. GILL: It seems to me that the duties of this Committee ought to go just so far as the By-Laws of this organization permit, and that there ought not to be any interjection of unpleasant or personal feeling into the matter whatever.

I understand from the reading of the report that a good deal of this material to which Dr. Butler has referred was merely personal observation of the members of the Committee, and I think the interjection of that into this report should be excluded. Any report that this Committee has to bring before this Association as to the condition of the various veterinary colleges in these states, that report should be made public, and we should know which of these schools are deficient, and what is necessary to be done whereby they could be improved, so as to be brought up to the standard as laid down by a statement of qualifications contained in our By-Laws. The report, ought, in the first place, to be based upon the resolutions or vote calling for the appointment of the committee, and

in the second place, I do not believe that any committee has the right to go beyond its duties as specified and set forth in the Constitution and By-Laws of an Association. If it has gained any personal information, or any observations of a personal character, these should not be announced before this Association, but should be sent to the various members of the faculties of the veterinary schools personally interested that they can amend their ways. If there is any deficiency in the opinion of the Committee in the way in which any individual school is being carried on, he wants to know it, and it seems to me that Dr. Hoskins is not asking too much when he requests that that material be made accessible.

Dr. Butler: I want to say this, that you can ask us as much as you like for these recommendations intended for these other colleges which we have made, and we shall positively refuse to give them. Why? Because we have told you plainly of those colleges which are complying, in our opinion, with the Constitution and By-Laws, and that is all we have any right to do, or that you have any right to demand. We have given you a definite, positive report, and all that you have any right to expect, so far as the Constitution and By-Laws empowers us to go. The report is complete as it stands. We have told you, however, that we did collect a lot of data, and believe it ought to be available. We learned something of a number of these colleges that we believe it will be helpful to them if we make certain friendly suggestions which we have asked you by way of recommendation to transmit to these schools, but we do not demand it of you. You can do as you please about it, of course, but we ask you, or we recommend to you that you do transmit these suggestions.

At the close of this discussion the motion made by Dr. Mayo was carried.

REPORT OF COMMITTEE ON REVISION OF VETERINARY ANATOMIC NOMENCLATURE.

Septimus Sisson, *Chairman*,

S. L. Stewart. I. E. Newsom.

Your Committee appointed to revise the veterinary anatomic nomenclature begs to submit the following report and recommendations:

After due consideration your Committee concluded that it would be advisable to present to the Association for consideration certain fundamental principles upon which in our opinion the revision should be based, and upon the approval of which the determination of many names would be contingent. Your Committee therefore presents these principles herewith for consideration and action, following an enumeration of them with a brief explanatory statement regarding each.

GENERAL PRINCIPLES GOVERNING REVISION.

First. Each part shall have a single name.

Second. The names shall be in Latin.

Third. Personal names shall be dropped.

Fourth. Preference shall be given to brief names, other things being equal.

Fifth. Related terms shall, as far as possible, be similar—e. g., femur, femoral artery, femoral nerve.

Sixth. The introduction of new terms shall be limited as much as possible. In the great majority of cases it will be sufficient to select one of the various names now in use.

With regard to the preceding principles the following statements may be made:

1. The Committee feels that very few exceptions should be made to the policy of excluding synonyms. A few may be advisable as: (a) a concession to clinicians, or (b) in cases in which homology is doubtful.

2 The desirability of the Latin terminology as the official standard is generally agreed to. A majority of the terms now in use are Latin; a great many of these have in reality become English words—e. g., meatus, plexus, ramus, septum, tenia, cranium, etcetera. This process of assimilation is going on continually. Students do not object to Latin names; they have certainly no preference for the "bicipital tuberosity of the scapula" over the "tuber scapulae," or for "the external angle of the ilium" over "tuber coxae." On the other hand it is distinctly understood that it is not in any way binding on any one to adhere slavishly to the Latin form, but that English equivalents, when used, should render as faithfully as possible, the official Latin name.

3. The exclusion of personal names is recommended on the following grounds: The personal names have usually no significance or are historically incorrect. Thus there can be no question as to the connection of the parotid duct (ductus parotideus, but the name Steno's duct has no associative value. The name Poupart's ligament is undesirable because this structure was described by Fallopio long before Poupart was born and it is not really a ligament at all.

4. Brevity is the soul of wit. "Dens" is better than "odontoid process;" "os coxae" than "os innominatum;" "cerebral aqueduct"

than "iter e tertio ad quartum ventriculum;" "peroneus tertius" than "tendinous portion of the flexor metatarsi."

5. The value of similarity in the names of related structures is self evident. The passage in the temporal bone which transmits the facial nerve is properly termed the facial canal, not the aqueduct of Fallopius; the hypoglossal nerve passes through the hypoglossal foramen, not the anterior condyloid foramen, etc.

6. In the selection of terms from those now in use many can be rejected without compunction as being unnecessary, erroneous, or otherwise undesirable. We can easily dispense with such names as os suffraginis, os innominatum, extensor suffraginis, flexor brachii, triceps abductor femoris, keratogenous membrane, etc. The lists of names contained in the B. N. A. and those determined by the conferences of veterinary anatomists in Stuttgart and Baden embody the conclusions arrived at by many of the leading anatomists of the world, and may therefore well serve as a substantial basis for the revision now undertaken. These lists, it should be noted, do not constitute a "new nomenclature" in the sense in which many seem to have the conception of them. On the contrary, they consist chiefly of carefully selected old names, with a minimum of new terms.

Your Committee further felt that it would be unwise to proceed with the selection or formation of several thousand names until it received the verdict of the Association on certain specific points. These concern the question whether it is desirable to adopt those terms indicating the position and direction of parts which are, as far as feasible, independent of the position of the body in space, and are capable of more general application than those more current. Reference is made here to the terms "dorsal" and "ventral" as compared with "superior" and "inferior" ("posterior" and "anterior" in man); "lateral" and "medial" as compared with "internal" and "external," with reference to relations to the median plane of the body, reserving the terms "internal" and "external" to refer to relations of depth in an organ; "cephalic" and "caudal" as compared with "anterior" and "posterior" ("superior" and "inferior" in man); "proximal" and "distal" with reference to relative distances of parts of the limbs from the long axis of the trunk or the vertebral column; "dorsal" and "volar" (fore-limb), "dorsal" and "plantar" (hind-limb) with reference to the lower parts of the limbs as compared with "anterior" and "posterior."

The Committee believes that there can be no question as to the desirability of adopting "dorsal" and "ventral" with reference to the head, neck and trunk. These terms are already much used, and are valuable in avoiding confusion, especially when the subject is placed in the dorsal recumbent position, as must frequently be done in dissecting and in operating. Similarly there can be no reasonable objection to "proximal" and "distal" with reference to the limbs. It also seems decidedly advisable to use the terms "dorsal" and "volar," "dorsal" and "plantar" with reference to parts of the limbs distal to the shoulder and hip. The Committee sees no reasonable objection to "lateral" and "medial" with reference to relations to the median plane of the body. The terms "cephalic" and "caudal" are now used a great deal in comparative anatomy, and seem to be steadily gaining ground; their adoption in veterinary anatomy probably cannot be long delayed and the profession would be taking an advanced position by adopting them now.

REPORT OF COMMITTEE ON THE FIFTIETH ANNIVERSARY ARRANGEMENTS.

A. Liautard, *Chairman.*
J. F. Winchester, *Acting Chairman.*

W. Horace Hoskins, William Dougherty, George H. Berns, E. B. Ackerman, R. W. Ellis, W. L. Williams, Harry D. Gill, James Robertson, W. Reid Blair, W. J. Coates, Thos. E. Smith.

The Committee in charge of arrangements for the Fiftieth Anniversary beg to report as follows:

First: That it is in the opinion of the Committee inexpedient to conduct a clinic in connection with the Fiftieth Anniversary meeting;

Second: That the McAlpine Hotel, Thirty-fourth and Broadway, New York, be tentatively selected as the headquarters for the Anniversary meeting and that the matter of making a definite selection and further arrangements be left in the hands of the Committee with power;

Third: That the Association appropriate the sum of fifteen hundred dollars to the Entertainment Committee for the 1913 meeting for the purpose of inviting as guests of the Association to the various sessions and to the banquet men of prominence in the profession and further be able to meet the expenses of such guests as may accept invitation;

Fourth: Your Committee recommends that the Honorable Professor A. Liautard be made honorary president of the Fiftieth Anniversary;

Fifth: That the morning sessions be opened by some man of prominence in the profession whose work has been linked with the activities of this Association during the past fifty years, and that the five vice-presidents of the Association preside in turn at the afternoon sessions;

Sixth: Your Committee recommends that only six or eight major subjects of interest to the profession be considered and the discussions be devoted to those particular subjects to the exclusion of the reading and discussing of topics of minor importance; and

Seventh: That the Chairman of the Finance Committee devise plans to raise $3,500.00 towards entertainment purposes in connection with the Fiftieth Anniversary celebration.

Papers and Discussions.

THE NORMAL CLINICAL URINALYSIS OF THE DAIRY COW.

By Daniel J. Healy, M. D.

Lexington, Kentucky.

During the study of a certain pathologic condition occurring among dairy cows, it became necessary to determine what might be considered a normal clinical urinalysis. The problem, which presented itself, was not to determine a complete urinalysis, but one which could be used as a clinical standard, any marked deviation from which would indicate an abnormal condition of the function of the kidneys.

The difficulties which are met with when an attempt is made to collect the urine for the entire twenty-four hours, and the bacteriologic and chemic changes which occur in a specimen during this period, make it very undesirable to use the twenty-four hour specimens for clinical purposes. The specimens used in the present work were obtained, once during the twenty-four hours, from the registered Jersey cows which form the experiment station dairy herd. The specimens, with the exception of four, were obtained during the period of evening milking, between the hours of four and six o'clock. At first, an effort was made to obtain the urine by means of a catheter, but this was found impracticable, as the difficulty of using the instrument, the risk of infecting the bladder, and the general disturbance created among the cows at milking time, more than counter-balanced the advantage of increased rapidity with which the specimens could be obtained. The method finally used, was that of waiting, with a one-litre saucepan, until a cow urinated, and then catching the urine in the saucepan. As a rule a cow will pass several litres of urine at one time, and it was the practice to allow the first portion of urine to escape, and then catch what followed. The average cow will urinate once every hour or hour and a half, and with a herd of thirty-two cows, there was very little delay in obtaining a sufficient number of

specimens each day. A clean one hundred and twenty-five cubic centimeters, glass-stoppered, wide-mouthed bottle was filled with each specimen, the date, time, and name of cow noted on the label. The bottles were then returned to the laboratory where they were immediately placed in the ice chest at a temperature of four degrees centigrade, where they remained until the following morning, at which time the analysis was made. The analysis was divided into three parts, the clinical, the chemic, and the microscopic.

THE CLINICAL DATA.

The clinical data included the date, the name and age of the cow, whether or not she was pregnant, and if so, the period of pregnancy, the number of pregnances, the time since last calving, and the feed.

THE CHEMIC DATA.

The chemic data included the color, the clarity or otherwise, and the precipitate. These points were observed while the urine stood in an ordinary urinometer glass. The specific gravity was observed with an urinometer. The reaction was tested with litmus paper. The urea was estimated according to Hufner's method, the principle of which is that urea is decomposed by an alkaline solution of a hypobromite, with the evolution of nitrogen gas which may be collected and measured, while the carbon dioxide given off, at the same time, is absorbed by the sodium hydrate solution.

The solution used was prepared in the following manner: One hundred and eight grams of caustic soda were dissolved in two hundred and fifty cubic centimeters of water, and the solution allowed to cool, twenty-five cubic centimeters of bromin were then slowly added. If the solution is tightly stoppered and kept in the ice chest it will remain good for several months.

The apparatus used was that known as the Doremus' ureometer, the sample being allowed to stand for one hour at room temperature, and the volume of gas corrected to a standard temperature.

To check the correctness of this method the following experiments were made: Seven ureometers were filled with the hypobromite solution, then to No. I, one cubic centimeter of urine was

added; to No. II, one cubic centimeter of the same urine to which one-tenth per cent of urea had been added; to No. III, one cubic centimeter of urine to which five-tenths per cent of urea had been added. The following table gives the results:

1.	One cubic centimeter urine, no added urea= 0.321% urea
2.	One cubic centimeter urine + 0.1% urea= 0.396% urea
3.	One cubic centimeter urine + 0.5% urea= 0.910% urea
4.	One cubic centimeter urine + 1.0% urea= 1.435% urea
5.	One cubic centimeter urine + 1.5% urea= 1.930% urea
6.	One cubic centimeter urine + 2.0% urea= 2.475% urea
7.	One cubic centimeter urine + 3.0% urea= 3.514% urea

The average error of the above six determinations is an increase of 0.1% above the actual urea added.

The ammonia was estimated according to a method kindly furnished by Doctor J. H. Kastle of this station. The principle of this method is that free ammonia reacts with formic aldehyde to form hexamethyltetramin, thus:

$$4NH_3 \times 6H_2CO = N_4(CH_2)_6 + 6H_2O.$$

Free ammonia does not occur in the fresh urine, but exists in the form of salts. If the urine is previously made neutral and then tenth-normal caustic soda added in the presence of formalin, free ammonia is formed and reacts as fast as formed with the formalin. The titration is done in the presence of neutral potassium oxalate which prevents the obscuring effect of ammonia on the sharpness of the end point with phenolphthalein. The following solutions are required:

1. A tenth-normal sodium hydroxide.
2. Commercial formalin, diluted one-half with water, and made neutral with sodium hydroxide, using phenolphthalein as an indicator.

The technique is as follows: About sixty cubic centimeters of urine are treated with three grams of dry basic lead acetate, well stirred and filtered. The filtrate is treated with two grams of dry neutral potassium oxalate, and filtered, using a dry folded filter. Ten cubic centimeters of the clean filtrate are then diluted with about forty cubic centimeters of distilled water, and twenty grams of dry neutral potassium oxalate, and a few drops of phenolphthalein solution added. The mixture is either slightly alkaline or acid. If alkaline a drop of dilute sulphuric acid is added, and

then it is neutralized with tenth-normal sodium hydroxide. If acid, it is also neutralized. Twenty cubic centimeters of the neutral formalin solution are then added, well stirred, and the solution again titrated with tenth-normal sodium hydroxide to neutralization. The reading of the second titration represents the number of cubic centimeters of tenth-normal ammonia in ten cubic centimeters of urine.

To check the correctness of the above method the following experiments were made:

A sample of urine tested 0.0042 per cent ammonia. Then to four portions of this urine of ten cubic centimeters each, sufficient ammonium chloride was added so that the total ammonia would be increased 0.001 per cent, 0.01 per cent, 0.1 per cent, and 1.0 per cent. The following table gives the results:

10 cc. of urine,	no NH_4 Cl.	tested 0.0042% NH_3
10 cc. of urine + 0.0003 gram	NH_4 Cl.	tested 0.0053% NH_3
10 cc. of urine + 0.0033 gram	NH_4 Cl.	tested 0.0134% NH_3
10 cc. of urine + 0.0332 gram	NH_4 Cl.	tested 0.1014% NH_3
10 cc. of urine + 0.3324 gram	NH_4 Cl.	tested 0.9965% NH_3

The average error was a loss of 0.0053 per cent.

The estimation of the hippuric acid presented difficulties which at first seemed impossible to overcome. However, as the methods used for estimating both the urea and ammonia proved fairly accurate, and as these together with the hippuric acid would represent the total nitrogen content of the urine, the following method for estimating the hippuric acid was used: The urea and ammonia were first determined according to the above methods, and then by multiplying the percentage of urea by the factor 0.4666, the percentage of urea nitrogen was determined, and by multiplying the percentage of ammonia by the factor 0.8235, the percentage of ammonia nitrogen was determined. Next the percentage of total nitrogen was determined by the Kjeldahl method as follows: Ten cubic centimeters of urine were placed in a Kjeldahl flask, and ten grams of powdered sodium sulphate and twenty cubic centimeters of concentrated sulphuric acid added. The contents of the flask were then digested over a free flame for two and a half hours, or until all color had disappeared. After cooling two hundred cubic centimeters of tap water were added and sufficient saturated caustic soda solution to make slightly alkaline, a small quantity of powdered zinc to prevent lumping,

and the ammonia distilled into a known quantity of sulphuric acid, after which the sulphuric acid solution was titrated with a tenth-normal caustic soda solution, using cochineal as an indicator. The urea and ammonia nitrogen were subtracted from the total nitrogen and the difference calculated as hippuric acid. To check the correctness of this method the following experiments were made: Ten cubic centimeters of human urine was tested with the following results:

Two samples, calculated urea nitrogen	1.1816%
Two samples, calculated ammonia nitrogen	0.1077%
Calculated total nitrogen	1.2893%
Actual total nitrogen, Kjeldahl method	1.2471%

Then eight samples of ten cubic centimeters of the same urine were taken in duplicate of two and two. To the first set 0.01 gram of hippuric acid was added, this being equal to 0.1 per cent. To the second set, 0.05 gram of hippuric acid was added, this being equal to 0.5 per cent, and so forth. The following table gives the results:

3-4.—0.1 per cent added hippuric acid.	
Total nitrogen, Kjeldahl method	1.2570%
Hippuric acid calculated	0.1265%
5-6.—0.5 per cent added hippuric acid.	
Total nitrogen, Kjeldahl method	1.2860%
Hippuric acid calculated	0.4974%
7-8.—1.0 per cent added hippuric acid.	
Total nitrogen, Kjeldahl method	1.3200%
Hippuric acid calculated	0.9321%
9-10.—3.0 per cent added hippuric acid.	
Total nitrogen, Kjeldahl method	1.4680%
Hippuric acid calculated	2.8296%

The above table shows this method is fairly accurate in estimating the hippuric acid, the experimental error being greater than is shown by this table, for the error in reading the urea percentage will average 0.1344 per cent, which would amount to 0.0626 per cent nitrogen, which calculated as hippuric acid would equal 0.8004 per cent.

The presence or absence of sugar was determined by Fehling's copper sulphate method.

The presence or absence of albumen was determined by heat-

ing to boiling the upper portion of about ten cubic centimeters of clear urine contained in a test tube, and then adding, drop by drop, a dilute, (one-tenth) solution of acetic acid, the production of a cloudiness being considered a positive test for albumen.

MICROSCOPIC DATA.

Fifteen cubic centimeters of the urine were precipitated in the electric centrifuge, running at six hundred revolutions per minute, for ten minutes. The precipitate was then placed on a microscope slide, a cover glass placed over it, and examined with a magnification of one hundred and forty diameters.

Analyses were made of one hundred samples, collected from twenty-nine cows, during a period of six months. The months and the number of samples examined in each month were as follows:

January	20 samples	May	11 samples
February ...	9 samples	June	12 samples
March	22 samples	July	26 samples

The samples were either colorless, fifteen per cent, or yellow in color, eighty-five per cent. Thirty-two per cent were pale yellow, twenty-seven per cent deep yellow, and twenty-six per cent yellow. The color and specific gravity varied with the season and feed. During January, February, and March they were as follows:

		Specific Gravity.	
Deep yellow,	17	1000-1010	18
Yellow,	16	1010-1020	17
Pale yellow,	17	1020-1030	5
Colorless,	1	1030-1050	11
	—		—
	51		51

During May, June and July they were as follows:

		Specific Gravity.	
Deep yellow,	11	1000-1010	28
Yellow	10	1010-1020	16
Pale yellow,	14	1020-1030	5
Colorless,	14	1030-1050	0
	—		—
	49		49

Specific gravity ran from 1000-1049, and averaged 1014.

Reaction: Alkaline, eighty-two; neutral, ten; amphoteric, seven per cent; slightly acid, one.

Urea from 0.04 per cent to 4.04 per cent.
Average, 1.06 per cent.
Hippuric acid from 0.01 per cent to 4.15 per cent.
Average, 1.17 per cent.
Ammonia from none to 1.0161 per cent.
Average, 0.0009 per cent.
Total nitrogen from 0.11 per cent to 1.92 per cent.
Average, 0.58 per cent.
No sugar.
No albumen.

Squamous epithelial cells were observed in sixty-three per cent of the specimens, and irregular vegetable cells in forty-four per cent. Amorphous matter was observed in twenty-seven per cent, and mucus corpuscles in twenty-one per cent. Spiral vegetable cells were observed in twenty per cent, and starch granules and calcium sulphate crystals in thirteen per cent each.

The normal urine of a dairy cow would, therefore, present an analysis approximately as follows: Color: yellow; specific gravity: 1014; reaction: alkaline; a slight flocculent precipitate, and occasionally a heavy white precipitate of calcium sulphate; urea: 1.06 per cent; hippuric acid: 1.17 per cent; ammonia: a trace; total nitrogen: 0.58 per cent; no albumen; no sugar; microscopic examination: squamous epithelial cells, irregular and spiral vegetable cells; starch granules, calcium sulphate crystals and amorphous matter.

ANIMAL METABOLISM UNDER CONDITIONS OF POOR VENTILATION.

By C. C. Lipp,

St. Paul, Minnesota.

Bulletin number 98 issued by the veterinary division of the Minnesota agricultural experiment station in November, 1906, presented a brief account of experimental work on stable ventilation; this work was begun in April, 1904, and so far as the writer knows, was the first systematic attempt to study the physiologic effect of poor ventilation. Since the appearance of this bulletin, containing suggestions as to the probable explanation of part of the so-called harm resulting from poor ventilation, work corroborating the results there recorded, and much additional work, has been carried out. Results thus far have only served to verify and strengthen the ideas set forth in the above bulletin. Since this work was begun, several seemingly well-established theories concerning poor ventilation and its evil effects have been investigated and overthrown by other workers, but we still claim priority in the work undertaken. Research bulletin number 132 in preparation at present will contain detailed accounts of this work.

OBJECTS.

The objects of this experimental inquiry are twofold: First, to determine the cause and location of injury resulting from lack of ventilation. It has been very generally taught and accepted that lack of ventilation is speedingly and permanently harmful. This may be true, but to quote bulletin number 98 "there is very little available information that is based on any actual demonstration or other positive source of knowledge. Cattle seem to thrive under what are apparently the worst possible conditions of stabling and it is easy to find herds that are doing badly in stables of apparently the best possible construction." Further, "the wide variations in statements of writers on house and stable hygiene and the importance of stable ventilation in our northern states during the long cold winters, readily make the importance of this experiment apparent."

Second, to establish reliable and efficient methods for measuring the effects of poor ventilation on animals. This, of course, can only be done after the first object of the experiment is proven; namely, that lack of ventilation is harmful. After establishing a satisfactory method for measuring the effects of poor ventilation, a standard of purity for stable air, may be determined beyond which it is not safe to go. The amount of air space actually required by an animal, and the number of cubic feet of air requiring removal every hour, for the maintenance of this standard of purity can then also be determined.

PLAN.

Stall. An unventilated stall with cement floor and metal-lined walls and ceiling was provided. The capacity of this stall was nine by ten feet by seven feet high, and contained a tight, well puttied window. The stall was not air tight but an air fouler than that collecting in the most unsanitary stable could easily be maintained. No attempt was made to determine the highest per cent of carbon dioxide that an animal confined in this stall could stand, but rather it was aimed to produce conditions just a little worse than those present in the unventilated farm stable. A determination of the per cent of carbon dioxide was made at frequent intervals, and found to vary from twenty-nine parts per ten thousand parts of air to two hundred and sixty-seven parts.

Animals. At first one steer six months old was confined in the unventilated stall just described for a week or ten days, while another steer used as a check was under observation in a well ventilated stall. At the end of this period the steers exchanged stalls, for a similar length of time.

Later steers were confined in the unventilated stall for periods of six, twelve, twenty-four, and forty-eight hours respectively. Still later other steers were kept in this unventilated stall continuously for several months, under daily observation and test, at sufficiently close intervals to detect the beginning of any abnormal condition. The last phase of the experiment, namely, the confinement of steers in the unventilated stall for several months, has been repeated with several groups of steers. The first group contained one steer in the unventilated stall, and two as checks in a well ventilated stall. The second group contained two in the unventilated stall and two checks. The third group, that in

progress when this article was written, contained three steers in the unventilated stall, and three as checks.

The steers were from four to six months old, weighing approximately two hundred and fifty pounds each when experimental work with them began. Their weights increased regularly during the entire time of the experiment, usually for about six months, although several steers were kept for nearly twice this length of time. When work with them was completed, they weighed from five hundred to seven hundred pounds each.

ACTUAL WORK.

Gain in weight. In one series of experiments the two animals in the ventilated stalls gained daily an average of .94 and 1.14 pounds respectively, while two others in the unventilated stall gained daily but .525 and .484 pounds respectively. In a second series one steer gained thirty-eight pounds in twenty-seven days and another gained thirty pounds in twenty-three days, both in the unventilated stall. Still other steers made even greater gains, so that it seems safe to conclude that with gains of from nearly one-half to a little more than two pounds daily, the general health must have been good before these gains were possible. Sometimes the steers in the unventilated stall gained faster than the checks but at the end of each series all differences could be readily accounted for by difference in type, conformation and feeding capacity. Weighings were regular and at intervals of seven to ten days, throughout each series.

Feed and appetite. The steers' appetites remained quite uniformly good, most of them never missing a feed. Occasionally one would eat sparingly but the loss of appetite was never complete nor extended beyond one or two feeds. All feed was of good quality, clean and palatable. The grain was a mixture of ground corn, oats, bran, and oil meal. Hay was clean bright upland, the best on the market. All feed and water were weighed, so as to give each steer a known quantity. Any feed remaining in the mangers was weighed and deducted from the quantity fed. There was no difference in the quantity consumed by the steers in the ventilated and unventilated stalls.

Stall Temperature and humidity. On account of the location of the unventilated stall, with exposure to southeast only, and surrounded by other stalls having a fairly constant temperature,

conditions were as favorable as could be arranged for maintaining a constant temperature, without installing apparatus for this purpose. During midwinter the temperature was close to sixty degrees Fahrenheit. In the spring and early summer it increased and occasionally reached eighty-five degrees above which it was not considered safe to allow the heat to accumulate.

The construction of the stalls made the absorption or evaporation of water almost a negligible factor. As a result humidity in the unventilated stall was almost constantly at one hundred per cent, so that mangers, and all exposed wood soon became saturated and covered with molds. It was not unusual when entering the stall, to see plain evidence of a fog. Often the confined steers' hair was quite wet.

Animal comfort. There was no evidence of discomfort at any time. During midwinter as long as the temperature in the unventilated stall did not exceed seventy degrees Fahrenheit, pulse and respiration were but very slightly increased. In the late spring and early summer the temperature often reached eighty, and occasionally eighty-five degrees when pulse and respiration were considerably accelerated. Sometimes the outdoor temperature dropped suddenly. This caused a decrease to seventy degrees or lower in the temperature of the unventilated stall, and an immediate return to normal in both pulse and respiration of the confined animals.

The expression of eye, color of visible mucous membranes, and condition of hair and skin were practically identical in both groups of steers at all times. Judged by this evidence alone it seems that lack of ventilation is not always or necessarily harmful, at least to the degree that was heretofore believed. Dr. Hill[1] of London believes that high temperature exercises a paralyzing or inhibiting action on the elimination of heat from the body. Corroborating evidence is offered by the work under discussion.

WORK WITH BLOOD.

General plan. The parts played by the erythrocytes and hemoglobin in the absorption of oxygen from the pulmonary alveoli and its distribution to all body tissues for the maintenance of their vital activity received careful and extended attention.

A study of variation in the time required for blood to clot, and

[1]Hill—A Novel Doctrine of ventilation, in Journal of American Medical Association Volume LVI, No. 14, page 1048.

viscosity as an index of the blood's carbon dioxide content were taken up, to determine if they might serve as a measure of the harmful effects, if any, of poor ventilation.

A study of the leucocytes was likewise given considerable prominence. Their role in the maintenance of normal health by disintegrating and liberating food materials; their role in the elimination of cell foods prepared from foods absorbed from the intestinal tract; and an estimation of each variety, as indicative of normal health, each in turn received attention.

A determination of the leucocytes' opsonic capacity and the bactericidal power of blood serum are at present under investigation.

Erythrocytes. The number of bovine erythrocytes varies in different animals and at different times under normal conditions. Burnett[2] states this number to be 7,055,000 per cubic millimeter. As a result of a large number of determinations the number was found to vary between 6,000,000 and 8,000,000 per cubic millimeter, in each steer while in a well ventilated stall, with the average close to that given by Burnett.

A careful comparison of the erythrocyte determinations of each animal's blood before being placed in the unventilated stall, with the determinations from the animals used as checks, failed to disclose any permanent or uniform variation that could be associated with poor ventilation.

Oerum[3] discussing the functional value of blood says that tint and oxygen-binding property are elements independent of the hematin content. Evidence just presented is sufficient to lead to the belief that the number of erythrocytes furnishes a very unreliable index of the blood's oxygen-carrying capacity, even when hemoglobin and erythrocyte variations are proportionate.

Hemoglobin. The per cent of hemoglobin varied considerably but was oftenest between eighty and one hundred per cent. There was no permanent increase or decrease of this blood constituent under any of the conditions of poor ventilation. With an increase of carbon dioxide of ten, twenty, or more times the quantity contained in pure air, steers were able to distribute ample oxygen for their needs. That is to say that a high per cent of carbon dioxide resulting from ordinary respiration does not interfere with the oxygen carrying capacity of blood. It was dem-

[2]Burnett—Clinical Pathology of the Blood of Animals, page 48.
[3]Oerum—Functional Value of Hemoglobin in Deutsche Med. Work, Volume XXXV No. 28, page 1217.

onstrated that ordinary respiratory processes cannot vitiate the air to such degree that it will not support normal animal life. Manifestly the evil effects of poor ventilation do not reside in a reduction of the available oxygen supply, or lack of its proper distribution to the body tissues as measured by the number of erythrocytes or per cent of hemoglobin.

Leucocytes. The functions of the leucocytes are not all clearly established, and all the functions attributed to them are not uniformly accepted by all authorities. The following according to Howell[4] may be regarded as among the most clearly established. *First:* their assistance in the protection of the body against infections both by their power to ingest bacteria, and to excrete bacteriolysins which are destructive to bacterial life. These two functions collectively have been named the "biologic reaction"; *second:* they aid in absorbing fats from the intestine; *third:* they aid in the absorption of peptones from the digestive tract. This is more particularly true of the leucocytes of the intestinal lymphiod tissue; *fourth:* they play a part in blood coagulation by the liberation of substances entering into fibrin formation, when the leucocytes disintegrate in recently shed blood; *fifth:* by their disintegration in circulating blood they probably assist in maintaining the normal protein composition of the plasma. Granting that these are the functions of the leucocytes, and the evidence seems well established, all these functions were performed in a normal manner, because the steers at no time showed evidence of ill health, or that any of these functions were abnormally performed, while under conditions of poor ventilation. If any of them had been performed in an altered manner, the evidence either laboratory or clinical would have been such as to make its escape from notice quite unlikely. For instance: had not the proper quantity of fat or peptone been absorbed by the leucocytes there would have been arrested development and less gain in weight. So also, if the disintegration of these leucocytes had not proceeded normally and in adequate quantities, clotting time would have been changed. One steer was dehorned a few days before being placed in the unventilated stall. Wound healing progressed at the same rate as in another steer kept in a well ventilated stall.

Phagocytosis. It is known that certain varieties of leucocytes play a very considerable part in the protection of an animal

[4]Howell—Text-book of Physiology, page 431

against infections, by ingesting the invading bacteria. If the leucocytes' power to ingest and destroy such bacteria is uniformly lessened as a result of confinement in an unventilated stall, a ready means for the measurement of the injurious effects of such confinement will have been found. The evidence thus far accumulated leads to the belief that lack of ventilation does interfere with the leucocytes' phagocytic function, but observations have not extended over a sufficient range of conditions, or with large enough number of animals to warrant conclusions as yet. Further work along this line is expected to be productive of valuable results.

Bactericidal power of serum. Work thus far completed indicates a very decided lessening of the bactericidal power of the serum of animals confined in unventilated stalls. Should further work with a larger number of animals under more widely varying conditions show similar results they would be useful as a measure of the harmful effects of poor ventilation.

Indeed both the phagocytic power of leucocytes and the bactericidal power of the serum have such close connection with the animal's ability to combat infectious diseases, that the subject carries with it sufficient importance to warrant a further and more extended study.

Blood clotting. Clotting depends on the elimination of thrombokinase from disintegrating white corpuscles and platelets immediately on the shedding of blood, and its mixture with a juice from the wounded tissues. Should conditions of poor ventilation play a part in either accelerating or retarding this action uniformly and constantly, a valuable measure for the evil effects of poor ventilation or a physiologic test for the sufficiency of ventilation would be available. The time of clotting was near sixty and very seldom fell below fifty seconds. Work in progress fails to disclose any marked variation between the clotting time of steers confined in the ventilated and unventilated stalls. There is no more variation in fact than is found in the blood of steers confined in a well ventilated stall. Indeed, it seems safe to conclude that the blood's ability to clot is in no way hindered by conditions of poor ventilation.

WORK WITH URINE.

Methods of collecting. For the purpose of analysis a sample was invariably taken from the well mixed twenty-four hour urine,

the collection of which was briefly as follows: A stall seven feet long by three feet wide was raised thirty inches from the floor. The steer entered this stall by passing up an incline. A large leather funnel suspended beneath him by straps passing over his body, collected all urine as fast as voided. It was then conducted through a leather drain into a pail suspended beneath the floor. A steer confined in this stall was at liberty to move from side to side, backward and forward, lie down and get up at will, without interfering with the collection of urine. Urine secreted during a steer's confinement in this stall was not modified in its composition by fatigue, discomfort, excitement or other unfavorable influences. Steers were just as comfortable in the urine stall as out of it. Comparison of a large number of analyses of urine from the same steer made it evident that this method of collecting was satisfactory. Comparison of the analyses from a number of steers further verified this statement.

Reaction. Reaction of the urine was almost invariably alkaline. An occasional acid urine was found, but in no case did the secretion of such urine continue for any length of time, nor was it accompanied by evidence of altered or perverted metabolism.

Albumin. Occasional slight traces of serum albumin or globulin were found. Neither was constant in quantity or quality, and was interpreted as representing but fluctuating phases of normal metabolism, and in no way indicative of altered or perverted tissue activity due to confinement in unventilated stalls.

Bile. The presence of bile in the urine indicates a stasis of this excretion in the liver, with osmosis into the blood and lymph vessels, and later its elimination by the kidneys. That the functions of the liver in the production and elimination of bile were normally carried out was attested by the absence of bile or its pigments from all but one specimen of urine.

Blood and blood pigments. The origin of blood in urine is either from the excretion of hemoglobin or hemorrhage from the kidneys or posterior urinary tract. Search for these abnormal urine constituents was for the detection of any increased or perverted activity of the blood destroying organs or a hemorrhagic condition of the posterior urinary tract. One steer confined in an unventilated stall showed occasional traces of hemoglobin in his urine. This same steer occasionally had an anal discharge of bloody mucous and at the same time his rectal mucous lining was

quite red and easily visible through the partly relaxed anal sphincter; he did not show the same thrift and vigor that the others invariably showed, but, notwithstanding this, made an average gain of .525 pounds daily, while his mate that appeared normal in every way made gains at the rate of .484 pounds daily. Microscopic examination of the kidneys of this steer showed a well marked disintegration of many of the glomeruli. Since no other steer showed either clinical or laboratory evidence of a similar condition, we concluded we were working with an animal that was not perfectly normal when he went into the experiment, which abnormality did not become apparent until work had been in progress for some time.

Nitrogen. When nitrogen intake and excretion are equal, an animal is said to be in nitrogenous equilibrium. Nitrogen intake is measured by a determination of the total amount of nitrogen contained in the daily quantity of food consumed. Nitrogen excretion occurs through various channels, namely, in the urine, feces, sweat, tears, and all other body excretions. When an animal is in nitrogenous equilibrium, its weight remains practically constant. With a growing animal such condition is exceedingly difficult to maintain because when nitrogen intake and output balance, growth is at a standstill. No attempt was made to keep our steers in nitrogenous equilibrium, consequently no attention was paid to the quantity or composition of fecal matter. Neither was an analysis of feed considered necessary to determine nitrogen intake. So long as they continued to thrive and gain in weight as growing cattle should, the requirements of the experiment were considered fully met in this particular.

Urine was the only excretory product to receive attention for a determination of its nitrogen content. Since this element appears in the urine from two sources; namely, exogenous and endogenous, both the total nitrogen content of a twenty-four hour sample, and a determination of the nitrogen excreted as urea were made. The latter nitrogen resulting from the disintegration of body tissue serves as an index to cellular activity in metabolic processes. The former nitrogen results from the excretion of various nitrogen containing compounds not entering into the composition of urea, and from the ingestion of more food than the tissues can use to replace that broken down by vital activities.

The proportion of total urinary nitrogen to the nitrogen excreted as urea was taken as the true index to nitrogen meta-

bolism. But very little difference between the index of metabolism in the steers in the poorly ventilated stalls and the others in the well-ventilated stall was found. Steers in the unventilated stall; after a confinement of several months excreted only very slightly more nitrogen per pound of body weight than those kept in the well ventilated stall. This makes a slight showing in favor of the ventilated stall, but does not take into consideration differences in ability to digest and assimilate.

Sugar. The presence of sugar in the urine was only occasional, and in but one animal. Urine from all others was free from sugar at all tests. Since sugar appeared only occasionally in the urine of one animal, in which there was no other evidence of altered or perverted metabolism, its presence was not accepted as a true guide to perverted carbohydrate metabolism. Indeed, to maintain that lack of ventilation does not alter or pervert glycogen metabolism, appears well founded.

AUTOPSIES.

An interesting feature of the work was autopsies on steers confined in the unventilated stalls. These autopsies were made at the close of work with each group of steers, and included a microscopic study of the following tissues: heart, lung, lymph gland, pancreas, liver, small intestine, kidney, and spinal cord. All were hardened, sectioned, and stained, in the usual manner.

Careful study failed to reveal the slightest trace of abnormal or pathologic condition in any organ save the kidney from one steer. He presented clinical evidence of being a little out of condition several times, when he voided urine containing distinct traces of blood. Microscopic examination showed quite a marked disintegration of the glomerular epithelium. If this condition was the result of poor ventilation, it seems as though a similar condition should have existed, in the other steers kept under similar conditions. Since such was not the case, the kidney lesion was attributed to other causes than those of poor ventilation.

SUMMARY.

The following summary covers the important facts established, relative to "animal metabolism under conditions of poor ventilation:"

First: That disturbances of pulse, respiration, and body tem-

perature were not sufficient to interfere with normal physiologic functions, even with humidity at one hundred per cent, so long as the temperature did not exceed eighty degrees Fahrenheit.

Second: That appetite and general condition remained uniformly good with no detectable evidence of altered physiologic processes.

Third: That animals confined in unventilated stalls continued to make very fair gains in weight during the entire time of each experiment.

Fourth: That the distribution of oxygen and elimination of carbon dioxide were not disturbed.

Fifth: That the function of the leucocytes in promoting the various metabolic and nutritive processes remained apparently unaltered.

Sixth: That all metabolic processes appeared to proceed in a normal manner in animals confined in unventilated stalls. This is proven by the results of many urinalyses and further supported when these urinalyses are compared with urinalyses from other animals kept in well ventilated stalls. In this connection it must be remembered that steers and stalls were both free from infection by germs of contagious diseases.

Seventh: That respiration by animals confined in unventilated stalls did not reduce the oxygen content of the air sufficiently to interfere with healthy growth and development.

Eighth: That there was no histologic change in the structure of any important tissue or organ.

Ninth: That the accumulation of carbon dioxide resulting from respiration in an unventilated stall was harmless.

Tenth: That stable ventilation is highly necessary for the maintenance of proper stall temperature and humidity.

Eleventh: That lack of ventilation may probably reduce resistance to germ infections, although more evidence is desirable.

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THE NATURAL AND ACQUIRED QUALIFICATIONS OF A SURGEON.

By R. C. Moore,

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The qualities of the surgeon are subject to at least two divisions; first, into those traits or qualities derived from ancestors either near or distant, inborn natural ability or that inheritance of the Creator that adapts one for a certain thing or calling in life; second, those qualities acquired during life, by training and practice. Dr. W. J. Mayo, the noted surgeon of Rochester, Minnesota, has well said: "Our spoken language recognizes the truth in the word 'calling'. May not this be the way the great Creator calls men to do his work in the various walks of life?"

History proves conclusively that to man has been given the power to meet every condition of life. No matter how great the necessity, some one has been found with the essential qualities to meet it, and in these individuals we find developed those traits or natural qualities that enable them to succeed in that particular thing, where others would have failed. This does not dispute the Divine power of direct intervention, but proves the plan of human agency, so truly "man's extremity is God's opportunity." This principle is surely as true in the minor details of life as in the great crisis of the world.

To become a surgeon it is not only necessary that the individual possess the natural ability to do surgical things, but it is also important that he should possess the qualities of a man in the broadest sense of that word. A man of strong character, sober, industrious, with broad philanthropy, keen perception, a determined will, kind heart and uncompromising integrity, and one who honors truth for truth's sake. Possessing "the heart of a lion, the eye of an eagle, and the hand of a woman."

The true surgeon has in mind only the welfare of his patient. Kindness should be his motto, and firmness to follow his convictions his password. The man who is cruel, unsympathizing and heartless, no matter how skilled, has no more right with the surgeon's knife that the crudest workman has with the sculptor's

chisel. No true surgeon will cause the slightest unnecessary pain, yet with all he is governed by judgment rather than sympathy.

A nervous individual is not calculated for a surgeon as he is always subject to unnecessary errors. Deliberation of action is essential to the end that everything needful be done and no tissue be unnecessarily injured. If methods are not precise, needful things are likely to be omitted.

Courage is also an important factor. At times the surgeon must assume great responsibilities, and if he has not the courage to assume these promptly, the result may be disastrous. Promptness is of equal importance; no doubt many animals die for want of prompt surgical interference, as often a few hours will carry the patient beyond the possibility of successful surgical assistance.

A fearless disposition, steady, kind, firm, and a commanding way is of vast importance in veterinary surgery. Our patients usually recognize fear and timidity in those handling them, and are apt to take advantage of it. Likewise our clients and the bystanders are quick to note this defect and prompt to publish it to the surgeon's discredit. The owner and attendants of our equine patients are usually good horsemen and are often ready, and perhaps "rightly so," to criticise the lack of the same in the veterinarian.

I would not underrate careful, deliberate preparation, but emergencies arise that must be met promptly, and it is then that the surgeon must have the courage to act immediately and do the best he can under the circumstances. One should not fear criticism, for if he is satisfied that he did the best he could, that satisfaction is better than pleasing a multitude.

It is true that our country is fairly alive with surgeons. Is it true that they are successful? How many of them do things simply as they are taught to follow step by step some previous instructor and when something out of the ordinary presents itself they are conspicuous for their lack of ability to devise a method of treating it?

Beware of the charlatan in our profession; whether he is an undergraduate or the possessor of a veterinary degree, if he follows the steps of a quack he should have the brand. He who professionally, or otherwise, commits an act that tends to lower the professional or moral standing of the veterinarian, strikes a blow at every member of our profession. We should not be too

free to condemn, for it must be remembered that mistakes extend even to the president's chair, but to uphold a premeditated, non-professional, dishonest act or to shield one guilty of such, is scarcely less detestable than to commit such an offense.

Is the judgment of the surgeon not too often influenced by mercenary consideration? Industrial economy enters more largely into our professional work than it does into that of our brethren who are charged with the welfare of human kind. As a rule the animal is bred, reared and cared for to be of service or pleasure to its human owner. The right of the owner to use such animals for his pleasure or profit, even to the taking of its life, so long as he does not treat it cruelly, has not been seriously questioned. Recognizing this right, it would be the duty of the veterinarian to recommend the humane destruction of the patient whenever in his judgment, his skill as a surgeon cannot restore the animal to a condition of reasonable service or pleasure to its owner.

Too often operations are undertaken where the very nature of the case indicates so long a period of convalescence, or of so doubtful a termination that the treatment would be unprofitable to the owner, also the animal would suffer pain without profit and the surgeon lose his reputation and his client.

Public sentiment favoring humane treatment of defenseless animals is rapidly increasing all over the civilized world, and none should be more interested in its advancement than the veterinarian. So when a veterinarian causes serious or prolonged pain in the performance of surgical operations without the use of anesthetics, either general or local, he brings criticism upon himself and his profession. We are living in an advanced age of surgical success, and more is expected of us today than ever before, and we should ever be mindful that the requirements of man are in proportion to his opportunities. The one who does not give the best he has is unworthy. He owes it to himself, his client, and most of all to his patient, that every avenue of possible pain and danger be safeguarded.

The acquired qualifications of a surgeon should perhaps out number his natural ones, but they would be of little value did he not possess at least a reasonable share of the latter.

It has been said that "surgeons are born, not made." While this statement is the essence of truth, it may too often lead to grievous error, for sometimes an apparently small amount of natural ability will develop to magnificent proportions under

proper influence, supported by a determined will and ceaseless energy.

Surgery is an art and may well be classed as a fine art and students of the arts who become masters usually spend long periods of service under competent instructors. Why should he who would become a surgeon be exempted from such teaching?

The fundamental principle in the cure of disease is a correct knowledge of the conditions, hence the first acquired qualification for a surgeon is ability as a diagnostician, and to attain this one should begin at the lower round of the ladder. He first becomes familiar with all tissues of the living animal, including their form, structure, relation and action; second, he gains a substantial knowledge of disease including its cause, anatomic changes it may produce and the effect of such changes on other organs. As the cure must depend upon the removal of the cause, he must know what effect the removal of that cause will have upon the individual. If this is not understood, the animal may suffer needless pain and inconvenience. When these things have been carefully considered and the competent surgeon has reached a conclusion that a certain operation is necessary for the good of the animal and welfare of its human owner, he should then have the firmness of purpose to carry out that operation to its complete termination. The owner should be fully acquainted with every possible danger, and when he with this knowledge consents to the operation, the case should be fully in the hands of the surgeon who should enforce his rights to complete the operation regardless of the whims of the owner. A steady nerve, deliberate action, exactness of location and precision as to methods are all essential.

The surgeon should be an untiring worker. No matter how well one has mastered his anatomy, physiology, pathology, bacteriology, etc., unless the memory is often refreshed, that clearness of relation so essential to successful surgical procedure is lost. The laboratory offers the best opportunities for this much needed review, but it is not the only opportunity. I fear too few of our practitioners of veterinary medicine and surgery, either general or special, avail themselves of the almost unlimited opportunity offered for careful autopsies.

How many of our brothers practicing human surgery would consider the opportunities of holding autopsies that we neglect as most favorable for their advancement, did not law and custom

prevent? Not only are we thus privileged to ascertain the pathologic lesions that caused the death, but to refresh our minds on the normal structure as well. These are not all the advantages which are at our pleasure for we are favored with an almost unlimited opportunity to practice the various surgical operations on the cadaver.

Someone has said in discussing the training of the human surgeon "that the boy so destined should be taught the principles of evolution, natural science, the general laws of plant and animal life, and especially comparative zoology, elementary physics and chemistry, and at the same time his hand should be trained by animal dissection." In addition to his school, college and hospital training, he should have several years' experience as a general practitioner as the importance of correct diagnosis in surgery cannot be overestimated. This is true in veterinary surgery as well as in human practice. There is perhaps no better way to become familiar with pathology and morbid anatomy than in the general practice of medicine, particularly is this true if the autopsy is not neglected.

We are told that "Cleanliness is akin to Godliness." Surely nowhere is this more true than in surgery. Perfect cleanliness is so closely related to asepsis that the mentioning of one causes us to think of the other. If perfect asepsis is maintained throughout the operation and subsequent treatment, little short of destruction of vital organs is likely to produce death.

A great deal of truth is contained in the statement that "antiseptic surgery is largely a matter of habit." If a man is untidy and careless about his person, clothing and habits, when not engaged in operations, he will not be likely to make the radical changes necessary to be clean during such operations. If one fails to observe asepsis in minor things, he will scarcely be able to apply it to the major ones.

An uncontrolled temper is a great detriment to the veterinarian. Many things in the handling of animals tend to irritate and provoke outbursts of temper on the part of the surgeon. When not controlled these seriously interfere with subduing the animal, rendering the operator nervous and unfit for his task as well as displeasing all present.

Temperate habits are also essential. He who indulges in strong drink to excess should never be trusted with the surgeon's knife. Over indulgence in anything that tends to lower the vital forces

soon underminds the health, wrecks the nervous system, and renders the individual unfit for service, especially for a surgeon.

"The final making of the surgeon is of three parts, viz.: First, experience; second, experience; and third, experience." Specialization in the practice of medicine and surgery is fast growing into popularity. The one who does the same thing over and over, day in and day out, year after year, must surely become more proficient than the one who only does it occasionally. The ideal can seldom or never be attained, but the nearer we approach to it the better.

Some operations require the cultivation of some one or more of the special senses, as for example the castration of the equine cryptorchid requires a well developed sense of touch, which is attained in a high degree only by frequently performing this operation. The clear thinker, who has had long and careful experience, preceded by sound education, bases his conclusion on the broadest possible knowledge and if he has developed a high degree of manual dexterity, he will come the nearest of being our ideal surgeon.

The veterinarian should understand his legal as well as his moral obligations to his client. It is well to know what to do, but often better to know what not to do. Malpractice not only consists in doing the wrong thing, but often in neglecting to do the right thing. The surgeon is not responsible for a failure to cure if he follows the prescribed methods and uses reasonable precaution. Animals to be operated upon must be restrained and such efforts are always subject to accidents for which the operator is neither morally or legally responsible if he has used reasonable care and precaution. New and untried methods in the practice of veterinary medicine and surgery should be tried carefully, remembering that not only one, but sometimes many tests are necessary to prove efficiency. It is in the use of the new methods that we often take the greatest risk. This might be due to a lack of familiarity with the thing or the method. Again, we might be liable for malpractice because we failed to use the comparitively new methods, providing they had been used enough in general practice to prove their worth.

To illustrate the surgeon's legal responsibility I will quote from the opinion of the supreme court of Colorado rendered in a case of surgery on the human kind that would seem to apply equally as well to veterinary practice:

"In the absence of a special contract the law implies that the surgeon employed to treat an injury contracts with his patient (client);

First. That he possesses that reasonable degree of learning and skill which is ordinarily possessed by others of the profession.

Second. That he will use reasonable and ordinary care and diligence in the exercise of his skill and the application of his knowledge to accomplish the purpose for which he is employed, and

Third. That he will use his best judgment in the application of his skill in determining the nature of the injury and the best mode of treatment. He is not responsible for want of success unless it results from a failure to exercise ordinary care, or from want of ordinary skill. If he possesses ordinary skill and exercises ordinary care in applying it, he is not responsible for a mistake of judgment."

From the foregoing opinion it will be seen that the legal as well as moral requirements are not for impossible things, but rather that one possess all the knowledge and skill he claims to possess; that he use reasonable energy and diligence in applying the same to the end that he does his whole duty to his patient and his client, and honor to himself and his profession.

RADIAL PARALYSIS, AND ITS TREATMENT BY MECHANICAL FIXATION OF KNEE AND ANKLE.

By George H. Berns,

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Attention was called to this striking and very peculiar form of lameness in horses, by Günther in his Myologie, as early as 1866. Möller in 1875 diagnosed it as paralysis of the radial nerve, and later on it was observed, and fully described by Fröhner, Hess, Cadiot, Hell, and others. In fact, it is referred to in almost every recently published work on veterinary surgery.

In Dollar's Translation of Cadiot's "Clinical Veterinary Medicine and Surgery," an entire lecture is devoted to the subject. In it, he presented a beautiful clinical picture of the disease, and its symptoms; and mentions external violence, or mechanical injuries to the radial nerve and the structures it supplies as its chief cause.

Möller, according to Cadiot, divided his cases into three groups, viz.: complete, incomplete, and partial, and the symptoms vary according to the degree and extent of the injury, and resulting paralysis.

The symptoms are minutely, and most accurately described by Cadiot, and I cannot do better than to use his own words.

"In complete paralysis the joints of the affected limb, with the exception of the shoulder, are usually flexed when the horse is resting. In consequence of loss of power in the triceps and anterior brachial muscles, the arm is extended and straightened on the shoulder, the scapulo-humeral angle is open, and the elbow depressed. The forearm is flexed on the arm by the contraction of the coraco-radialis, while the metacarpus and phalanges are bent by the action of the posterior antibrachial muscles. The knee is carried in advance, level with, or in front of, a vertical line dropped from the point of the shoulder. The hoof is usually rested on the toe, but when advanced beyond the above mentioned vertical line it may be placed flat on the ground, the joints then being less markedly bent. When the limb as a

whole is flexed, it may be brought into normal position by thrusting back the knee with sufficient force to counteract the action of the flexor muscles."

"In walking, the shoulder and arm are more or less 'carried,' the lame limb being moved as a whole; but as the lower portions of the limb are insufficiently extended, the stride is much shortened. The least attempt at placing weight on the leg causes all the joints to become flexed, and the shoulder and arm to suddenly drop; the animal, feeling its falling, instantly transfers weight to the other limb. At a more rapid pace the animal goes on three legs, as though suffering from some exceeding painful condition."

"Incomplete paralysis may either constitute a stage in recovery from complete paralysis, or an independent condition. At rest the limb is held as in the preceding form, but the entire plantar surface of the hoof more frequently comes in contact with the ground. In moving, lameness is less marked, and instead of occurring at every step may only appear at intervals, varying in length with the degree of paralysis, rapidity of movement, and smooth or rough character of the ground. The limb is slowly advanced, the stride shortened, and the hoof carried or dragged along the ground. The animal stumbles over the smallest obstacle, the limb immediately becoming flexed."

"In partial paralysis most of the muscles supplied by the radial retain their function, and disturbance is much less marked. As a rule, the position of the limb at rest is normal. During movement it is fully extended, the stride is of ordinary length, and the joints do not collapse when weight is placed on the limb. Slight lameness is visible at a trot, the shoulder and arm being more or less markedly carried forward, without, however, rolling outwards, as in paralysis of the suprascapular nerve."

According to European writers, the disease is self-limiting, and in all cases, except those complicated with fracture of the first rib, the prognosis is comparatively favorable, and no special line of treatment is indicated, further than, rest in slings in severe cases, massage, cold douches, light blisters, and when convalescing, gentle exercise on level ground.

While this condition is by no means of frequent occurrence, the writer ventures the opinion that a large number of the gentlemen present have seen cases of it.

When we first began to use an operating table for operations

upon the feet, we used the McGee-Hodson table, which has a very large and perfectly square top, and in order to bring the affected foot within comfortable reach of the operator, it was necessary to fasten it close to the front edge of the table, extending it probably twenty-four or thirty-six inches in advance of its fellow, which was secured in a natural vertical position.

In this position, all the flexors of the limb, and more particularly, the triceps and anterior brachial muscles were greatly extended, and if our operations were prolonged, or the animal struggled a great deal, it frequently happened that he would come off the table, suffering from a mild form of radial paralysis. In casting horses with the English hopples, and keeping them in lateral recumbency for a long time, or horses cast in a stall, and unable to rise without assistance, the same thing would occasionally occur.

We attributed this condition to functional disturbances of the muscles probably from over-extention, or a disturbed circulation from the awkward position of the limb, or prolonged inordinate pressure. We paid but little attention to them, and they all got well in time, varying from a few hours, to one or two days. Since our operating table has been altered, and this extension of the limb is no longer practiced, we have no more cases of radial paralysis from table restraint.

In the winter of 1897 and 1898 four severe cases of radial paralysis were brought to the writer's notice.

CASE NUMBER ONE.

A large truck horse, owned by Mr. J. A. P., while backing a heavy load, slipped and fell. When again on his feet, he was unable to place any weight upon the off front leg. He was carted home in an ambulance, and I saw him shortly after the accident, when he showed all the symptoms of an aggravated case of radial paralysis. He was standing in a single stall, and we found it impossible to back him out, for the moment he attempted to place weight upon the affected limb, the entire leg would collapse, the elbow dropping to within twelve to eighteen inches of the floor, the body descending, and only by instantaneous shifting of the body weight upon the sound limb, would he save himself from falling. He was placed in slings, treated as outlined above, but showed no improvement during the first

two months. Then he was fired and blistered over the triceps muscles, which showed marked atrophy. In ten days he began to show a little improvement, was placed in a large box stall, and allowed to lie down. Fortunately, he got up without assistance, and he was left alone for the rest of the winter, turned out to pasture, in the spring, and finally recovered in seven or eight months.

CASE NUMBER TWO.

Seen in consultation with the late Dr. R. R. Bell, about three weeks after the writer had placed the J. A. P. horse under treatment.

His case was almost a facsimile of mine. It was treated with hypodermic injections of strychnin in addition to the local treatment, and the writer saw him in a pasture field six months later, much improved, but still lame.

CASE NUMBER THREE.

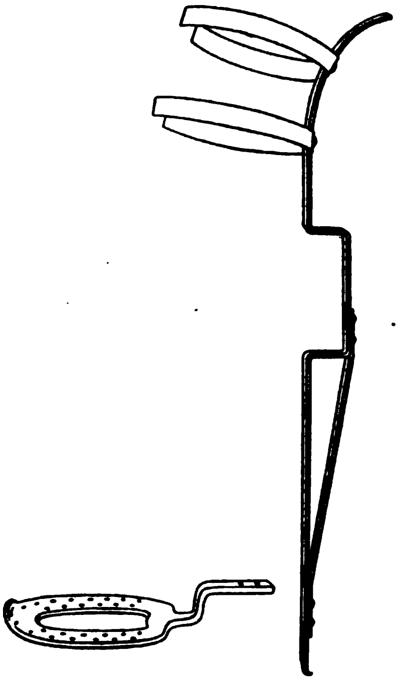
Another consultation call. This time with Dr. Elisha Hanshew, on his own driving horse. He slipped and fell, sustained radial paralysis, and was treated for several months, and finally disposed of as practically incurable.

CASE NUMBER FOUR.

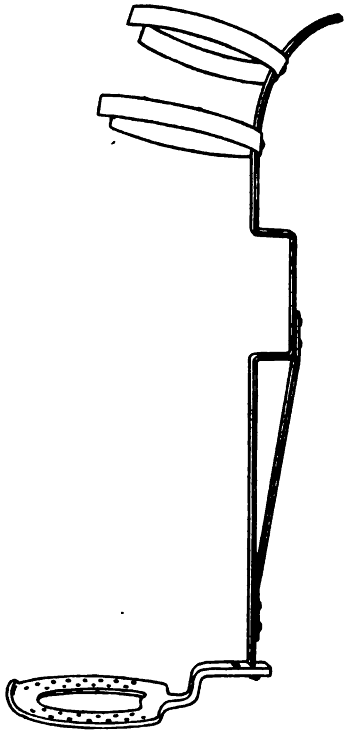
Occurred in my own practice. A heavy draft horse, examined by the writer for soundness in January, 1898, developed a radial paralysis in February, as a result of a runaway accident. This, like the preceding three cases, was also an aggravated form of complete paralysis. He was treated for six weeks at the owner's stables without apparent results, and the owner then decided to have him destroyed, but finally consented to have him sent to our hospital in an ambulance for experimental treatment at our own expense.

Having noticed the dropping of the elbow, and the enormous elongation and stretching of all the muscles situated in the scapulo-humeral angle in all these cases, it occurred to me, that some benefit might be derived if these muscles could be placed in a state of rest. With this object in view, and, after considerable experimentation, I succeeded in devising the iron knee and ankle brace here illustrated.

Drs. R. R. Bell and Elisha Hanshew were invited to see it tried on case number four which had arrived and was occupying a large box stall. With great difficulty the horse was brought out upon the operating floor, a distance of probably twenty feet. The entire limb was carefully wrapped in cotton, and a large pack placed in the posterior radial region; the bar shoe with the extension spur was applied, and with the assistance of two strong



Iron brace and shoe for knee and ankle fixation. (Berns.)



Iron brace and shoe for knee and ankle fixation. (Berns.)

men, one pulling the knee, and the other pushing it in a backward direction, we succeeded in placing the limb in a perpendicular position, slipped the brace into its proper place, and with the aid of a stout strap placed in front of the knee, and over the brace behind the knee buckled tightly, retained the brace in position until it had been securely bandaged to the limb, from the fetlock to the elbow.

The animal immediately seemed to realize the great support and comfort the brace afforded, by placing his weight upon

the paralyzed limb, and with a little assistance by pulling the leg forward and outward, he soon learned to walk into a single

Iron brace and shoe attached—radial paralysis. (Berns.)

stall, a distance of forty or fifty feet, where a sling was placed under him.

The patient, as well as his brace and bandages, were carefully watched, but as no swelling, restlessness or symptoms of dis-

comfort appeared, he was left undisturbed for eight days, when Drs. Bell and Hanshew were invited to see the brace removed.

The animal was backed out of his stall without any trouble, walked to the operating floor with no assistance, and when the brace was taken off, to our great astonishment and gratification, he walked a distance of at least ten feet without showing the slightest sign of weakness. The leg then began to tremble, and would have probably collapsed if the brace had been left off, but after a good hand rubbing, it was reapplied. The following week, the brace was removed every second day, the leg massaged, and a little exercise on perfectly level ground allowed. After that, the shoe was removed, the brace taken off, and the patient allowed to lie down in a box stall. He was regularly exercised, and two weeks later, four weeks from the date the brace was first applied, he was sent home, and did excellent service for his owner for years after.

Fourteen years have passed since we first used this knee and ankle brace, and we have employed it in probably twenty-five or thirty cases, all of which have made satisfactory recoveries in from one to three weeks; but it is only fair to add, that possibly one-half of this number would have recovered without the brace. However, we made it a rule to use it in all cases of two days' standing. It is also very probable that none of these cases was complicated with a fracture of the first rib or severe injuries to the brachial plexus.

Now a few words as to the brace itself, its object, and mode of application:

It was designed to fix the limb in a perpendicular position, and to place the paralyzed muscles in a state of rest, without causing undue pressure upon any part. If properly applied, a space of an inch or more is left between the brace and the leg from the foot all the way to the center of the fore arm, where the brace is slightly curved in a backward direction, and rests upon the fleshy bellies of the flexor muscles, which should be well padded with small cushions or pillows made of aseptic wool, (see cut number three) and changed frequently during hot weather to prevent maceration of the skin from perspiration.

As the connection between the extension spur of the shoe and the brace proper admits of a limited amount of motion, the patient soon learns to secure comfort by placing the limb

in advance of its fellow, partly turning up the toe, resting on the spur of the shoe, and releasing all pressure from the posterior radial region. Straps and buckles attached to the brace would improve its appearance and probably simplify its application, but fear of severe pressure and troublesome sloughs, prompt me to use ordinary roller bandages which enables me to exert an equal amount of pressure upon the leg from the foot up to and including the fore arm, and thus, the danger of pressure necrosis is reduced to a minimum.

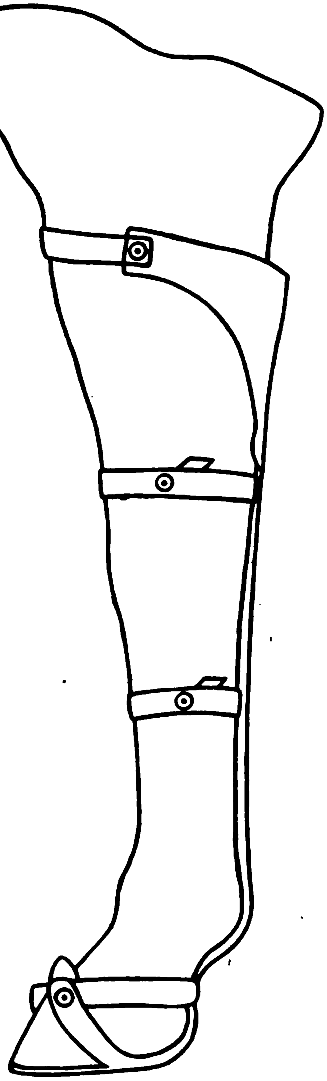
Now the interesting question arises, why is this simple treatment so effectual?

It is a well established clinical fact, that over extention of muscular tissue produces temporary paralysis. When we consider that the mild forms of radial paralysis above mentioned, as having been produced while animals were kept under restraint upon the operating table, with elbow extended but slightly—and the severe cases with the enormous extension and stretching of all the muscles attached to the olecranon and situated in the scapulo-humeral angle which takes place every time the patient attempts to place weight upon the affected limb, is it not reasonable to suppose that the very violent and often repeated and continued over extension of these muscles is largely responsible for this persistent lameness?

I am of the opinion that in the milder forms of this disease, the trunk of the radial nerve is rarely involved, and that the symptoms are due to an obstructed circulation from pressure or functional disturbances of the muscles from over extension. In the severe forms, we have no doubt, but that the nerve itself is primarily involved, and perhaps from over distention, or pressure due to accidental causes has temporarily lost its function, producing paralysis of all the muscles it supplies; but I am convinced that the muscles while in a state of complete paralysis are subjected to enormous strains, frequently repeated, which temporarily destroy the contractile power of their fibers, and cause persistent paralysis, secondary to, and entirely independent of the primary injury to the nerve. Upon this theory, the value of the brace as a remedial agent is readily explained.

The writer also believes that a somewhat similar condition exists in cases of so-called femoral paralysis and dropping of the stifle, following recovered cases of azoturia, and if a brace or some other apparatus could be devised which would keep the

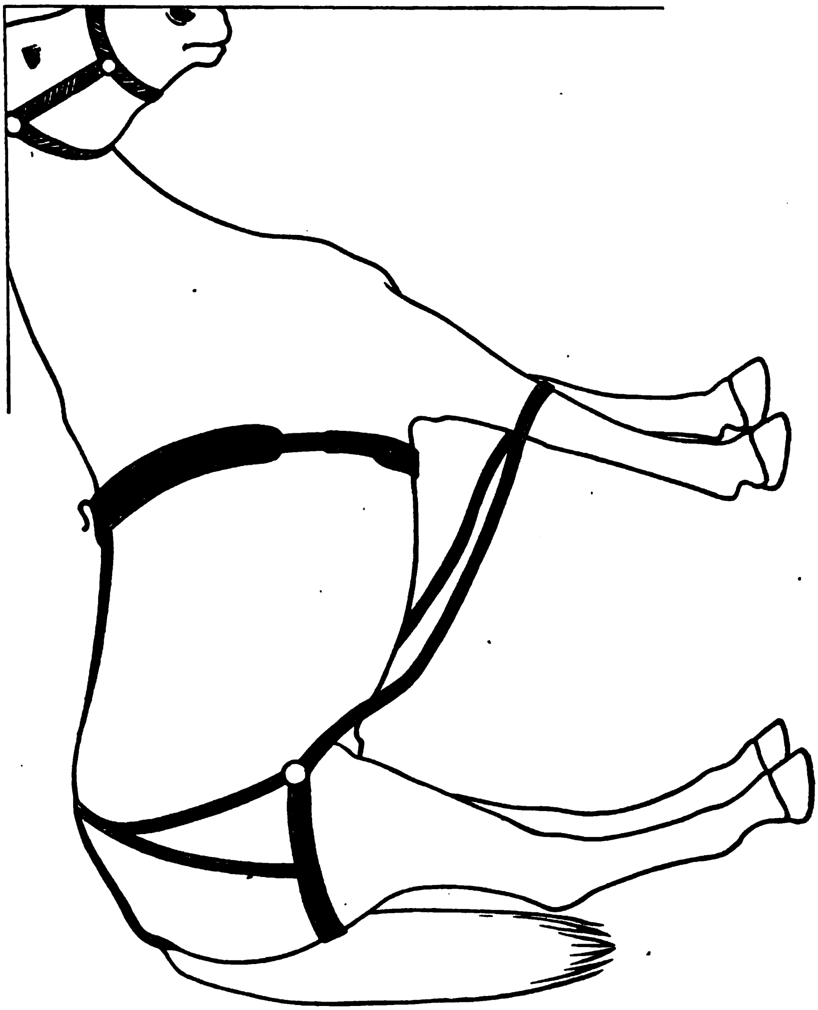
stifle in its place, and rest the muscles in the anterior femoral region, satisfactory results would probably follow, and shorten the period of convalescence.



Iron brace illustrated in Merillat's Surgery.

Dr. Merillat in describing his treatment of brachial paralysis evidently recognizes the advantages of mechanically placing the affected limb in a vertical position. He shows a very neat fit-

ting iron brace, which is made to follow the curves of the leg. It is equipped with buckles and straps and is applied close to the limb. He also illustrates another very simple, and original method of fixing the knee in brachial paralysis, by the use of



Merillat method.

an ordinary saddle, back strap, crupper, and breachment, and the knee of the affected leg is secured to the breachment, and in this way kept in a proper vertical position.

This method looks practical and seems to possess many ad-

vantages over a brace, if it will keep the limb in the desired position in severe cases. I have not had a bad case since seeing the illustration, but will certainly give it a trial at first chance.

DISCUSSION.

Vice-President Van Es: Gentlemen, you have heard the paper by Dr. Berns. It has been suggested by the essayist that Dr. David W. Cochran, of Brooklyn, be invited to open the discussion on this subject. Kindly give your attention to Dr. Cochran, gentlemen.

Dr. David W. Cochran: Mr. Chairman, in opening the discussion on Dr. Bern's paper, I desire to describe three different causes. In one the "astasia" is the result of the horse lying in a recumbent position for a length of time, as when cast in the stall for four or five hours or lying on an operating table for a protracted period resulting in paralysis of a group of muscles supplied by a nerve which has been subjected to prolonged pressure and due to circulatory disturbances in the nerve trunk. In the human being the arm or leg is said to be asleep. Secondly: radial paralysis is also due to traumatism. I have had cases of astasia occasioned by horses running away. In another case the horse had a heavy fall on his shoulder; again another cause is slipping on the street and the animal making a violent effort to prevent falling. As a third cause, do we observe radial paralysis as a sequel of anterior azoturia.

In radial paralysis, there is a loss of coordination between the flexor and extensor muscles. While the leg is in the upright position, the animal carries the body weight as though nothing was the matter; stands plumb, but the moment the vertical position of the leg is changed, we note this loss of coordination between the opposing groups of muscles. The knee is flexed and elbow drops very low, unable longer to support the body weight.

Treatment consists first in putting the patient in slings to prevent lying down and to endeavor to establish immobility of the leg which must be kept in a vertical weight bearing position until the function of the paralyzed muscles are sufficiently restored to a normal condition. The auxiliary treatment consists in applying to the foot a shoe having an upright bar of iron or brace extending up the leg midway between knee and elbow. The limb is well padded and this upright bar or brace made as secure as possible; there is, however, always more or less motion or friction and care will have to be exercised to guard against sloughing of the skin. I have had cases where sloughing of the skin was caused by the friction of the upright brace.

In the upright bar or brace designed by Dr. Berns, he has made provision for a recess opposite the pisiform or supercarpal bone, where it stands out especially prominent on the posterior aspect of some legs. It is an improvement on the straight bar. The supplemental treatment consists of rest and counter irritants to the shoulder.

The prognosis is generally favorable, unless fracture of a rib complicates the case as occasionally happens.

Dr. W. L. Williams: Mr. Chairman, we should bear in mind that in the method of handling which Dr. Berns has placed before us we are resorting to the first principle in surgery, or in the handling of disease, that of rest.

The illustration from Professor Merillat's book, (see figure) certainly shows a very simple and original plan and as the professor is in the room I should like to ask him if he does not add something to prevent the strap from stretching down over the carpus. I would like very much if he will explain whether it stays there just the way the illustration gives it or whether there is something to keep it up.

Dr. L. A. Merillat: Mr. Chairman, the apparatus in the illustration, of course, is not a special apparatus at all. It is one improvised in each case and usually supplied out of the harness cabinet of the stable where the horse is found. Naturally, it is up to the ingenuity of the surgeon to so arrange the strap that it will not fall down. I find that by wrapping a bandage about the leg six or seven inches above the knee and then buckling the strap around the latter it will stay in place very well. But just as Dr. Berns has said, "such affairs as this can loosen up and need a little attention." It is really an apparatus that requires constant surveillance. If the horse is left to his own resources day after day and week after week naturally the apparatus will shift in position. Again, another thing has to be borne in mind. In a really bad case of brachial paralysis it requires straightening up quite frequently. A horse in moving may sometimes double the foot under him and thus remain helpless until the strap is rearranged. Yet this method causes less abrasion of the skin, less pressure and necrosis than any apparatus I have ever used.

I have never seen or heard of Dr. Berns' special brace and have always used a close fitting brace similar to that observed in the picture. This I must admit is an objectionable apparatus because of the bruises it is liable to inflict to the skin where fastened, and to protect it even with bandages is not always sufficient because the constant pressure, even though it is slight, you know, from experience, causes a sloughing of the skin; once abrasions are produced the whole plan of treatment may have to be given up as hopeless in order to allow the wounds to heal.

I have always looked upon radial paralysis as a nerve trunk disease, yet I am willing to be convinced that muscle stretching may sometimes be the cause. In cases of long duration, however, I rather think it is a neuropathic paralysis and this differentiates the trifling from the serious condition. If the muscle is simply stretched I think the condition will correct itself reasonably early. If the nerve trunk is injured, then naturally the paralysis will be prolonged in accordance with the severity of the nervous injury. Of course, whenever, the first rib chances to be broken I believe the disease is incurable. When a patient presents week after week and month after month a more and more serious state of decrepitude, and finally is shot to end his misery, I think muscle injury cannot explain the phenomena.

Another and a very good quality of fixing the leg is the fact that it makes the defective leg bear its burden, which I assure you is no unimportant part of the treatment; in that it prevents the opposite leg from

breaking down under the strain of supporting the full weight of the body.

Dr. Joseph Hughes: Mr. Chairman, I have been much interested, indeed, in Dr. Berns' very excellent paper and the description which he gives of his method of handling the condition known as radial paralysis. He deserves our respect and gratitude, for presenting, more especially his novel brace and impressing upon us the importance of applying support to the lower portion of the limb in this condition.

In the front limb radial and in the hind limb crural paralysis often confront the veterinary practitioner. Radial paralysis is a condition of considerable interest to the student of lameness for the reason of the variation in symptoms which it presents, making it possible to confound it with other conditions, more especially brachial paralysis, and muscular strain or rupture. This, Dr. Berns has brought to our attention. When these three conditions are confused; and it often requires the keenest judgment on the part of the diagnostician to disentangle them, faulty diagnosis followed by faulty prognosis results. In my early experience in practice I acknowledge having frequently erred in respect to these conditions. As time passed, however, close observation and the experience of others have enabled me to differentiate the symptoms sufficiently, to at least satisfy myself.

The brachial plexus of nerves leaves the thorax by winding around the first rib about its middle third. Of the many branches of this plexus, all excepting the diaphragmatic are distributed to the front limb, as well as to a majority of the twelve muscles connecting this limb to the trunk. When through traumatism (broken first rib) or other causes this plexus becomes seriously involved, the entire limb as well as the muscles which attach it to the body, becomes paralyzed, so that it hangs limp and helpless, sometimes with the foot directed backwards, sometimes forwards with its plantar surface flat on the ground, the knee being flexed and the elbow dropped eight or twelve inches below the lower line of the chest. Weight bearing or motion on the part of the limb is utterly out of the question.

The radial nerve is the largest branch of the brachial plexus. It is given off between the scapula and chest several inches above the level of the shoulder joint and passing backwards and downwards it turns around the posterior part of the shaft of the humerus to gain its outer aspect, then crosses in front of the elbow point to terminate in the extensors on the anterior part of the forearm. The chief muscles supplied by this nerve and which interest us from a standpoint of lameness are the three caput muscles, lodged in the angle behind the scapula and humerus; also the extensor metacarpi magnus and the extensor pedis placed in front of the forearm. Observation leads me to the conclusion that there are three situations along the course of the radial nerve where traumatic lesions are peculiarly liable to affect it, causing complete paralysis of one or more of these groups of muscles, as well as great variations in the symptoms presented. The first situation is between the point where the nerve detaches itself from the brachial plexus and the part where it gives off the nerves supplying the caput muscles. In this instance all the exten-

sor muscles mentioned are affected. The paralyzed caput muscles allow the elbow to drop and the forearm is flexed on the arm, the knee being carried forward and the toe resting on the ground. In efforts to walk the leg is dragged as a whole. The extensors of the metacarpal and phalangeal region are involved and any attempt at weight bearing causes collapse of the entire limb. This condition closely simulates brachial paralysis in its symptoms, but the utter helplessness and inability to move the limb seen in brachial paralysis is absent here.

In the second form the lesion of the nerve is situated below the point where the branches supplying the caput muscles are given off. In this case the three extensors in front of the forearm are affected, the caput muscles not being involved. In instances of this kind the horse is unable to advance the lower part of the limb, which he carries under the body with the toe resting on the ground, in which position he cannot sustain any weight on the limb. If the lame member is brought forward by the hand until it is in line with the shoulder, normal weight can be sustained by it. In this condition the elbow is not dropped, the caput muscles being capable of performing their function.

In the third form, the lesion is confined to the radial branches supplying caput muscles producing paralysis of those muscles, the main trunk of the radial nerve not being involved. The differential symptoms here are significant. Standing quietly the limb is advanced, the forearm flexed on the arm; the knee carried forwards and the toe and sometimes the entire plantar surface of the foot on the ground. The elbow at the same time is dropped eight or ten inches below the lower outline of the chest. On moving there is relatively free extension of the lower limb, but in weight bearing the humero-radial angle closes and the toe pivots inwards, the dropping of the elbow being greatly increased during motion.

In addition to the variations of radial paralysis mentioned, we sometimes find a slight or incomplete form apparently confined to the branches of this nerve distributed to the extensor metacarpi magnus and the extensors of the digit, being a modification of the second form described. In cases of this kind no marked impediment in gait is observed at the walk, while at a slow trot he is lame, but if the whip is taken and the horse is urged to a fast trot he drags the lower limb, the extensors of the metacarpus and digit being entirely incapacitated for fast motion owing to insufficient nervous stimulus.

I cannot quite agree with Dr. Berns or with others who have spoken here on the advisability of giving complete rest in paralysis. I think that exercise is useful. There is no one more partial to rest in removing general lameness than I am, but there are cases where rest is not essential, and rest is not best.

In radial paralysis complete rest would, in my opinion, be injurious. We note that organs or tissues that are thrown into a state of disuse, tend to lose their function and so long as the disuse is continued, there is no tendency to restoration of function. This is particularly applicable to motor nerves. Create a demand for the generation of nerve force and it will be supplied.

Allusion has been made to crural paralysis, which we observe some-

times associated with, or following azoturia. In this condition the muscles known as the triceps cruralis are paralyzed. These muscles normally support the stifle, but when the crural nerve which supplies them becomes paralyzed they quickly atrophy, becoming less than one-fourth their ordinary size and having lost their function, when weight is placed on the limb collapse of the stifle joint occurs. If such a horse is kept in doors, even in a roomy box stall, it is doubtful if regeneration of nervous tissue and restoration of muscular function will occur, even after several years.

Turn the same horse out on pasture, and after an indefinite period—four to eight or nine months—he recovers use of these muscles.

If you will permit it I will tell you of a phenomenon I have observed on post-mortem examinations in crural paralysis, and which may serve to prove that it is the nerve that is involved in this condition and that exercise is decidedly essential. In ordinary post-mortem examinations nothing particular is observed about these muscles, except that they are shrunken in volume, their color compared with the surrounding flesh does not vary. On the other hand, whenever one of these horses finds his way to the dissecting room and is killed by blood letting and the skin removed, the crural muscles of the limb affected are seen to be small, shrunken and extremely dark red in color, strongly contrasting with the pale appearance of the surrounding flesh. The question arises: "Why this lividity; this deep coloration." The answer is simple enough. These muscles having lost their contractility owing to paralysis of their nerve supply, retain the blood, contraction not occurring to empty their vessels.

At this point a motion was duly seconded and carried that Dr. Hughes' time be extended.

Dr. Joseph Hughes: I wanted to touch on the matter of muscular strain and its relation to radial paralysis. When a muscle, or a group of muscles is strained, its function is temporarily destroyed. Inflamed muscle cannot contract; consequently, when this occurs we find lameness closely simulating that observed in paralysis. When the caput muscles are strained or ruptured discernible swelling and tenderness are present. Were it not for those symptoms the condition at the onset could be readily mistaken for radial paralysis. I believe that the principle advocated by Dr. Berns in his treatment of this condition is a very excellent one for the reason that the knee and the joints below need support; at the same time I think that exercise is a most important adjunct and that a combination of the two methods would bring most satisfactory results. I thank you.

Dr. George H. Berns: Mr. Chairman, the point I desired to emphasize more particularly is that the persistent paralysis of the muscles back of the shoulder is in my opinion due to oft repeated over-distention or violent stretching of their fibers, occurring every time the animal places weight upon the affected limb. I also believe that in chronic femoral paralysis following recovered cases of azoturia a similar condition exists, and if by a brace or some other mechanical means the stifle could be fixed, and the muscles situated in the triangular space between the external angle of the ilium and the stifle kept in a state of rest, favorable results would be very apt to follow.

STIFLE LAMENESS.

By David W. Cochran,

New York City, New York.

The subject the writer has chosen to present refers especially to lameness associated with pathologic conditions involving the femero-tibio-patella articulation commonly called the stifle joint, the lameness being a symptom or manifestation of some physical lesion, either isolated or complicated, affecting one or several parts of this apparatus.

I know of no subject in veterinary literature concerning which there is so much diversity of opinion; it is a condition which presents many variations, due to its anatomic complexity. The articulation is formed by the opposing surfaces of three bones so placed as to constitute almost two distinct joints, the femero-patella and femero-tibial; the latter forming an imperfect hinge joint, while the patella itself offers the greatest movement of any bone in the whole body. This joint is strengthened through the medium of interarticular menisci, or fibro fatty cushions; inter-articular and surrounding funicular ligaments, which are reinforced by the insertion of tendons of muscles surrounding the parts.

Diseases affecting this joint do not offer any classification but for general purposes a division may be made as follows: First, dropsical; second, nervous; third, arthritic; fourth, traumatic; fifth, spasmodic; and sixth, to diseased condition of bony structure.

DROPSICAL LESIONS.

Under this division there is a hydrarthrosis or hydrops articulorum, i. e., an effusion of a fluid into the joint without the existence of any apparent inflammatory process but, in reality associated with some structural change within the living membrane of the joint. This articulation is supplied with three synovial capsules, one belonging to the femur and patella, the others connecting the condyles of the femur with the facets of the tibia. The dilation of these capsules forms a soft tumor that rarely causes

any lameness except when it assumes large proportions, then may there be limited motion of the stifle. Again, we observe hygroma, an enlarged serous bursa or cyst. It is sometimes hard to differentiate between a prepatella hygroma and a femero-tibio-patella hydrarthrosis, for both may exist together.

The hygroma may deform the parts, but seldom produces any lameness or inconvenience to the animal.

NERVOUS LESIONS.

A condition may exist which is pathognomic, or again the sequel to azoturia; in one case the result is due to loss of power, in the other to an atrophy of muscles about the stifle joint, due to suspended innervation.

There is a great loss of function which no treatment, either external or internal, seems to benefit. Exercise of the animal's own volition at pasture gives favorable results.

ARTHRITIC FORM.

Under this heading, I will mention *gonitis*. A diseased condition characterized by chronic inflammation and degenerative changes involving the structure of the articulation, resulting in rigidity and atrophy of the muscles attached from the external angle of the ilium to the femero-tibio-patella articulation.

The tensor vagina is very tense and rigid; the stifle very prominent. This condition may be unilateral or bilateral. In the unilateral form, the horse stands with the limb flexed, does not care to support the body weight on it; stands with the pastern in extreme flexion, the anterior face of the foot rests on the ground, the plantar surface exposed as the animal often holds the foot clear from the ground. This hoof is smaller than its fellow; there is a drying out of the foot; a closing in of its sides; the heels growing high, and the shoe well worn at the toe.

In the bilateral form, there is observed, a constant shifting from one foot to the other, alternately holding one free from the ground; the back is arched; atrophy of the muscles of the patella region occurs, and when started off his movements are short and stilty. The motion of the stifles is limited.

Horses affected with gonitis are very hard to shoe. In the unilateral type, we start by shoeing the lame leg, bringing the hoof as near as possible to its normal shape. The foot is shod

with a shoe elevated at the heel, the toe flat. The application of the shoe to the foot is accompanied, with a leather sole, tar and oakum packing, thus keeping the foot moist and prevent drying out. Trouble commences when shoeing the foot of the sound leg. The shoer will have to lift and hold this leg with main strength, very often finding the horse will not stand on the lame leg, and the whole weight of the horse falling on the shoer's back. Should he attempt to shift the weight, the horse will in most instances fall to the floor. In the bilateral form, this trouble is observed with both legs.

The treatment of these cases consists of counter irritants, either vesicants, setons or the actual cautery. Some horses get sound temporarily, others never as the results are not always favorable.

In a post-mortem inspection of one of these cases, was found party coagulated, blood stained synovia; the cartilage of the patella was discolored, but smooth; the condyles and the trochlea were arthritic, showing some erosions and small exostoses on the external condyle.

TRAUMATIC FORM.

Traumatism is just as liable to this joint as any other in the horse. Sprains and wounds must appear occasionally. There may be a true luxation of the patella resulting from accidental causes; likewise, displacement of the patella occasioned as a result of laceration or elongation of ligamentous structure. I have seen horses with elongated tendinous structure that at each step taken, exhibited a distinct clucking sound. Another form of traumatism to which I would particularly call your attention is rupture of the cord of the flexor metatarsi which has origin at the inferior extremity of the femur in the fossa, excavated between the trochlea and the external condyle and terminates in two branches, a large one in front and attached to the superior portion of the principal metatarsus, the other deviates outward and is attached to the anterior surface of the cuboid bone.

This rupture is due to a violent effort on the part of the animal either when attempting to move a heavy load or when making a powerful struggle to avoid a threatening fall. The symptoms are: Walking with difficulty, leg hanging on the hock, buckling of the tendo achillis in extension, absence of flexion at the hock and the leg is drawn upward and backward during motion.

The rupture of the premetatarsal may take place at points along its length; sometimes at its femeral insertion or again, at its metatarsal insertion. When the rupture of the cord occurs in the tibial region, the ends becoming immobilized by muscular layers between which they are enclosed, readily cicatrize. Rupture at the superior extremity is of more serious consequence and in order to facilitate a cure the parts must be immobilized in order to hasten cicatrization and repair.

If an animal thus affected is forced to walk, the femero-metatarsal cord unable to influence flexion of the cannon bone upon the femur, there exists a loss of coordination and function as this region hangs powerless with the phalangeal column vertical; the tendo achillis no longer subject to the counter action of the flexor muscles is flabby and bent towards its insertion on the os calcis. When at rest the aspect is changed, no matter how serious the symptoms while walking, the leg which a moment ago was powerless, now participates in supporting the body weight, with the foot placed firmly on the ground surface.

Treatment. Secure immobility with absolute rest; apply counter irritation at the superior and inferior extremity of the cord. The prognosis is favorable.

SPASMODIC FORM.

Cramp, defined as a spasmodic, tonic contraction of muscles. Its etiology is obscure, there being much diversity of opinion as to the exact cause but generally believed to result from muscular, nervous, or vascular lesions, although most observations reported in veterinary literature under the title of cramp relate to a "Pseudo Luxation of the Patella." The writer has seen horses with cramp of the muscles of the anterior extremity.

The symptoms of pseudo luxation of the patella are shown when an attempt is made to back the horse from his stall. He refuses to budge, the foot of the affected leg seems fixed to the floor, the leg is rigid. If moved forward, the leg continues rigid, drags along behind its fellow on the anterior face of the hoof exposing the plantar surfaces turned backward. All joints in this leg are flexed, except the hip. When compelled to walk in this condition, movement is accomplished with exertions and great distress. It occurs in the standing animal, and can only be discovered when forced to move.

The primary lesion is a subject of much diversity of opinion as is likewise the manner in which this articulation, is so effectually locked. The causes of pseudo luxation of the patella are generally obscure. It often follows a period of confinement, on account of some debilitating disease and, likewise, as the sequel of a long rest. Some authorities contend there is a luxation outward, some inward, others that it is a fixation of the patella caused by cramp of the muscles which are focused to tendinous attachments on the patella. Still others attribute this disturbance to the anchoring of the patella upon the upper end of the internal lip of the femoral trochlea, the part being well fitted by its peculiar formation to prevent the small bone from sliding back over the rim and that it becomes fixed in its new position, by the irregular, and violent contraction of the muscles involved in abnormal movements. We never observe this condition in a horse at work, no matter how hard the labor. It seems impossible that such a state of rigidity can exist, as in some cases for a few hours, in others for days, yet in no instance do we ever find any inflammation as a sequel, or any pathologic change in any part of this joint. Treatment. If we agitate this animal with a whip; go through any manual procedure, either massage or pressing the patella in and out or up and down; extend the limb forward with a side line, or resort to the application of a stimulating liniment along the course of the tendo achillis, the symptoms disappear. Some practitioners resort to surgical treatment. Desotomy of the internal tibio-patella ligament known as the "Bassi" operation, others to a resection of the triceps femoris at their lower border. Good results are recorded.

This surgical procedure seems to be the inverse of any physiologic or mechanical theory. The patella normally lies above the condyles of the femur when the femero-tibial joint is extended, *and during flexion,* it lies in the inter-condyloid fossa, more on the external lip than upon the inner. If these surgical operations are right and give immediate results, what will be the results when these ligaments have again united?

Dr. W. L. Williams in an able paper on this subject, demonstrated with the aid of a mechanical appliance, by which the patella was made stationary above the internal lip of the trochlea, *that we do not* get extension backward, but on the contrary do get extension forward.

DISEASED CONDITION OF THE BONY STRUCTURE.

In young animals of rachitic diathesis there is a tendency to luxation of the patella. A predisposing cause being softening of the bones from impaired nutrition, there is a spongoid condition resembling decalcified bone due to a disturbance of the normal processes associated with bone growth—not that these bones become soft but they remain soft through failure to ossify. The periosteum stretches very easily, becomes thick and inflamed as a result of strains of ligaments.

There are also diseases of osseous structure in horses of advanced age; osteomalacia and osteoporosis where the bones are primarily hardened and developed normally, but subsequently become soft. We have in these forms also strains of ligamentous structure bordering on the periosteum and causing inflammation, swelling and elongation of tendons. These conditions are often confined to certain districts, resulting from malnutrition or bad hygienic surroundings. A change of diet and good hygienic conditions favor recovery.

In conclusion, I wish to give credit for many references in this paper to Chauveau's Anatomy, Dr. Liautard's articles on lameness, and also to the very elaborate papers by Dr. W. L. Williams and by Drs. L. A. and E. Merillat published in the American Veterinary Review.

DISCUSSION.

THE CHAIRMAN: The discussion of this paper is to be opened by Dr. Berns.

DR. BERNS: Mr. President, and Gentlemen:—I do not know that Dr. Cochran has left a great deal unsaid that might be mentioned in connection with stifle lameness. He has covered the subject thoroughly. His classification or division of causes is unique and original. The dropsical condition of the stifle is very frequently seen, and I agree with him that in the majority of instances it is not a cause of any inconvenience to the animal. In the second or nervous division where he calls attention to the persistent lameness following azoturia, there is a question in my mind whether the stifle joint is at all involved. I am inclined to think the muscles above this joint are the seat of the trouble, and that no pathologic lesions whatever exists in the stifle joint proper, but rather that the trouble is due entirely to paralysis of the crural muscles.

The third or arthritic division is the most difficult form of stifle lameness with which we have to deal and here the doctor gives us a very beautiful clinical picture of the unilateral as well as the bilated forms. However, he ventures no opinions or theory as to its possible etiology. In view

of the fact that this abnormal condition frequently exists in both stifles and originates without any apparent cause the theory of its probable rheumatic origin would appear to me to be tenable.

Referring to the fourth division or the traumatic forms: I have never seen a true luxation of the patella resulting from an injury; yet I see no good reason why it should not occur, but I question the advisability of placing rupture of the tendon of the flexor metatarsi muscle under the head of stifle lameness, as the joint proper is not involved.

In the fifth division, or spasmodic form, Dr. Cochran mentions pseudo (?) luxation of the patella, occurring in the stable and often following debilitating diseases. He describes the symptoms most accurately, calling attention to the great diversity of opinion as regards the exact position of the patella while the joint is locked and, moreover, that a violent contraction of the muscles involved is considered by some to be the exciting cause. He concludes by saying: "It seems to me impossible that such a state of rigidity can exist in the same cases for hours or days without producing inflammatory or other pathologic changes as a result." I fully concur in this opinion, for it is a well established fact that cramps of muscles, no matter where located, are extremely painful and yet the horse with his stifle locked, if left undisturbed, does not show the slightest indication of pain or discomforture. I believe that it is not a pseudo, but a true luxation of the patella due to a general relaxed condition of the entire system.

Dr. Cochran has given us a most valuable paper, treated his subject in a very thorough manner and given all of us much food for thought. I hope others will take up this discussion and should be much pleased to hear from Dr. Merillat.

Dr. Merillat: Mr. President, first of all, I want to congratulate Dr. Cochran on his splendid paper. The grouping together of a number of diseases belonging to one of the great articulations of the horse, is a mighty important way of bringing the subject of lameness before this profession. It is a plan that has not been adopted in veterinary pathology and diagnosis. The hip, and stifle, which play so important a part in that portion of the equine anatomy deserves a very exhaustive and detail study and though they furnish subject matter enough for a whole volume, most of our text-books that touch the subject at all, occupy only a few pages. If Dr. Cochran has done nothing more than to bring out this plan for studying lameness, his paper has been worth while. He has not exhausted the subject of stifle lameness because it is too vast to exhaust in a short paper, but he has taken up the most difficult of all the articulations of the horse, and given us an extremely interesting and important paper.

The stifle, as you will remember from your study of anatomy, is the great articulation upon which is centered nearly all of the large muscles of traction. The great muscles of the stifle are powerful and important in the movement of the animal and the propelling of the body, in pulling, and, as the region is a complicated aggregation of ligamentous structures, it is very susceptible to disease; in fact, very

much more susceptible than many veterinarians have seemed to imagine; it is more susceptible than veterinarians believe who do not study lameness carefully and critically.

I have not time in ten minutes to say one-half of what the subject deserves. Neither has Dr. Cochran had in the twenty minutes at his disposal, but I simply want to mention here as forcibly as I can, the importance of this plan of study, and to express the hope that some of the members will adopt the plan at future meetings, dealing with other large articulations, as it would lend much aid for the study of lameness.

One type of lameness which he did not mention has been diagnosed several times during the last few years. It is "floating cartilage" of this articulation. Several specimens of this affliction have been gathered together by Dr. Hughes. They are common diseases of human beings, but never before have they been described in veterinary patients. Gonitis is a very important one because it is recognized almost daily among city horses, especially among hard working horses. It is very evident that Dr. Cochran is correct when he says that gonitis is associated with some general rheumatic condition.

The question of surgical treatment of luxation of the patella was brought out in this paper. I think he has misunderstood to some extent some writers on this subject. I do not believe that any one has ever recommended division of any ligament to correct the so-called "luxation of the patella." This spasmodic seizure is usually cured in a more simple manner. The operation of a division of the ligament is performed for the cure of habitual luxation of the patella, so frequently seen in young animals, particularly in colts and calves. Such animals are born with weak supporting structures about the patella which do not keep the joint in place, and as a result the patella slips in and out continually. When the patella locks outside of the trochlea, the patient is unable to move the leg until the bone is replaced, and the object of surgical treatment in such cases is to prevent a locking of the bone, not by curing the disease, nor strengthening the condition, but it increases the relaxation so that the patella cannot lock over the external lip of the trochlea. In addition to this surgical treatment it is essential to promote the health of the animal, so as to build up its general strength. There is great value in this form of treatment in the proper kind of cases. If the relaxation is so complete that the bone slips in and out freely and does not lock, of course, surgical treatment is useless.

Speaking of traumatic luxation of the patella, Dr. Berns says he has never met such a case. I have seen two cases where there was a forcible displacement of the patella, and beg to assure you there will be no difficulty in recognizing the condition when seen. They are entirely different from the pseudo luxation, the leg is held elevated from the floor and no power can bring it down while at the same time the patella stands out like a man's hat on the side of the joint. A real case of luxation will never be mistaken and it is not very easily reduced; moreover, it is a very serious condition, leaving the horse a hopeless cripple for the rest of his life. The reduction of one case was effected by forcible

backward traction on the leg with a rope fixed to the foot. This patient when taken out into the open showed the patella standing out plainly under the skin. We tried, first of all, to pull the limb forward so as to straighten out the bone, and allow the patella to snap in. This was found impossible, causing such a considerable amount of pain as to render the mare difficult to control. More assistance was sought, I think in all we had eight men on the rope attached to the foot, but the great amount of pain from these maneuvers caused the mare to shy suddenly and break away from the man at the halter. She ran around the paddock with the eight men trying to prevent her escape, but pulling at the leg rope with all their power. While this struggle was going on something snapped, down went the mare's leg to the ground, and unexpectedly we reduced the dislocation. It seemed strange that the struggle of the eight men against the weight of the horse should accomplish what we were unable to do otherwise. Although the patella went into place, the mare never was a very useful animal afterward. I trust you all join me in congratulating Dr. Cochran on his good paper.

THE CHAIRMAN: Is there any further discussion along this line? If not, Dr. Cochran will close the discussion.

DR. COCHRAN: Mr. Chairman, I do not know as there is anything further to say on this subject without going into detail and there is hardly time for that, or is this really the place. In answer to a remark brought out under the head of traumatism, where one of the members explained that he did not think rupture of the flexor metatarsi tendon, came under the heading of lameness associated with the stifle joint (you will recall my giving in my paper the anatomy of the joint, stating that the tendon originates in the inferior extremity of the femur in the fossa between the trochlea and external condyle), I would regard any diseased condition of the stifle to mean any alteration in the component parts which go to make up the articulation of the femoro-tibial-patella articulation.

In answer to another question relative to alteration of the cartilagenous structures, I would say that those of the stifle joints are just as liable to inflammation and erosion as of any other joint, whether due to external violence, extreme exertion or to traumatism. I spoke of a post-mortem examination showing inflammatory evidence and erosion in and about the joint. Extreme effort on the part of an animal to move a heavy load or a call for more speed, whether the animal is a trotter, runner or hunter, will cause stretching of tendonous and muscular structures. A step on the ground surface followed by a violent effort to recover will cause a halt in the animal's progress often followed by lameness which may be transient or permanent. In very young animals with that diseased condition classified as rachitis, may be observed an improper juxtaposition of the cartilages due to an inability to support the body weight and there may be a gliding over of the surfaces from a true hinge joint to an outward position sufficiently to produce wear of the external condyle of the femur, even wearing it almost flat.

KNUCKLING AS A SYMPTOM OF SPAVIN.

By James McDonough,

Montclair, New Jersey.

I deem it a great honor to be allowed to address this body of veterinarians, being conscious of my inability to say anything upon any subject pertaining to veterinary science that can add to the knowledge of any man present. The only excuse offered in the form of an apology, is my irresistible desire to place before you, for your consideration, a subject that has occupied my attention for the past ten years or more, viz.: "Knuckling of the Hind Limbs as a Symptom of Spavin."

Knuckling is a voluntary disarrangement of the bones at the ankle that can be reduced at will by the animal. Where we have present conditions known to cause knuckling, it is very evident that the changes in the relation of the bones of the ankle are the result of the animal's effort to relieve the parts affected. As in a punctured wound of the foot, when the location of the wound is in the region of the heel, the ankle will immediately be thrown forward that the work may be lessened at the point of injury; so it is in the case of sprained tendons, or any other exciting cause found below the hock. But in all of these cases where the cause is evident, the location can easily be determined by the presence of heat, soreness or swelling and when the soreness has been relieved, the knuckling will disappear.

This applies to a very small percentage of knuckled animals, for in most cases, the cause is obscure and there is not the slightest evidence of heat, pain or swelling, nor is lameness present oftentimes for years after a horse goes knuckled, sometimes never.

It will oftentimes show itself first in one limb and then the other, again it may be confined to one limb, or may appear in both at nearly the same time as often seen in young horses, say at the age of from two to five years. In these cases its development is very gradual, the first symptom detected is a very slight displacement of the ankle when the foot first comes in

contact with the ground, to disappear when the limb takes weight. This will be followed by an interrupted condition of knuckling while at rest, when the animal will be seen to stand knuckled for a minute, or longer at intervals.

This condition is apt to progress and the animal may begin to stumble or "break over" behind. He may or may not show lameness, but at this time I challenge the skill of any person to detect the presence of a condition that can in any imaginary way be responsible for these changes, but here are effects, and a cause must be present, and our inability to find it must not be accepted by us as proof that it does not exist.

Permit me to quote the remarks of Professor Liautard as they appear in the book, "Diseases of the Horse," issued by the department of agriculture. I do this for the reason that the causes and treatment, as given by the doctor are, so far as I know, accepted by all horse owners and veterinarians and taught by veterinary colleges. Professor Liautard writes as follows: "As a consequence of the last mentioned lesions of the tendons a new condition presents itself in the articular disposition, constituting the deformity known as the knuckling fetlock."

"By this is meant a deformity of the fetlock joint by which the natural angle is changed from that which pertains to the healthy articulation. The first pastern or suffraginis bone loses its oblique direction and assumes another, which varies from the upright to the oblique, from before backwards, and from above downwards; in other words, forming an angle with its apex in front."

Cause: "This condition, as we have seen, may be the result of chronic disease producing structural changes in the tendons, and it may also occur as the result of other affections or some peculiarity independent of this and situated below the fetlock, such as ringbone, sidebone or traumatic disease of the foot proper. Animals are sometimes predisposed to knuckling, such, for example, as are naturally straight in their pasterns, or animals which are compelled to labor when too young. The hind legs are more predisposed than the fore to this deformity, in consequence of the greater amount of labor they are required to perform as the propelling levers of the body."

Symptoms: "The symptoms of knuckling are easily recognized. The changes in the direction of the bones vary more or less with the degree of the lesions. Sometimes assuming such a

direction that it almost becomes a true dislocation of the pastern.

"The effect of knuckling upon the gait also varies according to the degree of the deformity. As the different degrees of the shortening of the leg affect the motion of the fetlock, the lameness may be very slight or quite extreme. Another consequence of this shortening is such a change in the position of the foot that the heel ceases to come in contact with the ground and assumes a greater elevation, and the final results of this is soon witnessed in the development of a club foot."

Treatment: "To whatever cause the knuckling may be described it is always a severe infirmity, and there is but little room for hoping to overcome it unless it be during the very first stages of the trouble and the hope dwindles to still smaller dimensions, when it is secondary to other diseases below the fetlock. If it is caused by overworking the animal the first indication will, of course, be rest. Line firing has proved very efficacious in these cases. The animal must be turned loose and left unemployed. Careful attention should be given to the condition of his feet and to the manner of shoeing, while time is allowed for the tendons to become restored to their normal state and the irritation caused by excessive stretching has subsided. A shoe with a thick heel will contribute to this. But if no improvement can be obtained and the tendons, though retracted, have yet been relieved of much of their thickening, the case is not a desperate one, and may yet be benefited by the operation of tenotomy—single or double—an operative expedient which must be committed to the experienced surgeon for its performance."

From the above quotation it will be seen that the cause of knuckling is always attributed to some condition below the hock and treatment always applied to that part of the limb with acknowledged poor results.

That my position may be more easily understood let me divide knuckling into two classes: the one that is caused by an injury below the hock, when the seat of injury can always be detected, and lameness is usually present to disappear when the condition has been relieved; the other which develops where lameness is seldom present early enough in its development to cause us to suspect the one of being associated with the other.

Of the first class, which constitutes probably about five per cent of all cases of knuckling behind, already referred to as

having causes that can be easily detected and usually treated with success. Of the remaining ninety-five per cent I think we have much to learn.

If we hope to relieve knuckling, we must do so in its incipient stage and in order to do this, we must know its early cause.

As before stated knuckling is a voluntary act; the change in the relation of the bones is made for the express purpose of relieving some part of the limb of its work for we know that we cannot change the relation of any parts of the limb without causing a transfer of work from one part to the other. If the degree of knuckling increases, it signifies that a greater change in the relation of the parts is necessary that more relief may be extended to the affected part, and where lameness is present it can be accepted as proof that the relief so extended is not sufficient to permit the affected part to perform its work with comfort.

That this is true is shown in the condition of spavin. When we have a lame horse and suspect a spavin as the cause, we look for certain symptoms and conditions that exist below the hock, and when found to exist, they always strengthen our diagnosis. The symptoms consist of the animal starting off slightly on the toe, with the weight inclined in that direction and a limited flexion of the limb at the hock. The conditions that we would expect to find would be knuckling of the ankle, an increased growth of the hoof at the heel, and, if of long standing, a very pronounced thickening of the tendons, but no heat, swelling or soreness can be detected. In cases of lameness we look upon these as symptoms of spavin, but they are the very same conditions found and described by Professor Liautard as caused by knuckling. He refers to the change in the direction of the weight through the foot, for he says we have an increased growth of the heel. He says this growth may continue until we have what is known as a club foot, when the weight will pass through the toe in a vertical direction and, also, refers to the shortening of the flexor tendons, recommending tenotomy as a possible means of relief; but we, as well as he, look upon them as conditions caused by knuckling when lameness is absent, while when lameness is present, we consider them symptoms of hock trouble. In the one case we look upon the conditions as a cause, while in the case of spavin, as an effect, to the extent of allowing their presence to strengthen our diagnosis.

There is probably nothing more difficult for us than to discriminate between cause and effect, for many conditions that at first are effects, later become causes.

As a cause must precede the effect, it is hard to understand how thickened tendons and high heels can be considered as a cause of knuckling when knuckling always precedes these conditions. As a matter of fact we see many horses that have been knuckled for years with normal heels and tendons. If this be true, then it is hard to understand how we can expect to relieve knuckling by lowering the heels, or cutting the tendons.

When the conditions, referred to above, are present, they will be seen to increase as the knuckling increases. This would lead us to believe that one must be the cause and the other the effect, so if we exclude the high heels, etc., as a cause, we must look upon them as an effect, and accept the knuckling as the cause. For this reason we treat the ankle by blistering, firing, etc., but never with beneficial results.

These animals may continue sound and serviceable for years or may never take a lame step. Again, they may come from the stable some morning too lame to be put to work, as shown in the accompanying cut No. 1. This animal had been used in a coal yard for the past seven years under my personal observation and care and had never gone lame. One Monday morning, after playing in the yard the day before, he was found too lame to be put to work, hardly placing any weight on one hind limb. Liniment was applied to the hock and we allowed him to rest for a week when he again traveled sound; had this animal continued lame for a month more, there is no veterinarian who would not pronounce him lame in the hock. To confirm our diagnosis, we would point to the high heels and other conditions referred to in cases of knuckling and recognized by veterinarians and many horsemen, as symptoms of hock joint lameness. The only condition never referred to and always present in those cases, as a symptom of spavin, is the knuckling. But why ignore the knuckling at this time? We haven't accounted for its presence, we haven't as yet determined whether it be a cause or an effect. We have admitted that it is not the effect of any of the conditions found below the hock for it always precedes them; we cannot claim that it is the cause of these conditions for we now acknowledge them to be well recognized symptoms of a spavin.

If we have a cause, that cause can only be determined by its effect and having acknowledged our failure to relieve knuckling by the treatment of any or all conditions below the hock, we are compelled to look upon it as an effect.

If knuckling be an effect, then where is the cause? This we must know if we expect to relieve it. When caused by an injury of the limb below the hock, we immediately and unquestionably recognize it as an effect, for the cause can easily be detected, and if we are asked why the injury causes knuckling, we will explain that it is the animal's effort to relieve the injured part of a portion of its work. If that be true in these cases, why is it not true in all cases of knuckling?

With this theory in mind, let us look to the hock. If a horse is lame from a spavin the lameness signifies that that part of the limb is unable to perform its work with comfort, and instinct has taught the animal to relieve the parts by placing the limb in a position where the work of that part will be lessened. This the animal always does in a case of spavin lameness by voluntarily adjusting the parts to a position that will throw the weight in the direction of the toe. If the soreness increases, he will continue his efforts until the wall at the toe will be forced from an oblique to a vertical position.

Now we know that the more oblique the direction of the pastern bone, from behind to before, the more weight is thrown upon the heels, while the more vertical its direction, as seen in short pastern horses, the more weight comes upon the toe. This anyone can determine by the wear on the shoes. It will be seen by this that it would be extremely inconvenient for an animal to increase the weight in the direction of the toe, while allowing the ankle to continue in a position that will force it upon the heels. So it is quite natural that his first efforts will be to change the position of the bones from this angle and place them in a position that will lessen the angle and similar to the position they occupy in a short pasterned horse. This can only be done by forcing the ankle upward and forward,—the beginning of knuckling. As the ankle is forced forward the weight on the heels is relieved and the support they offer the limb has become lessened and nature now comes to the rescue by increasing the growth of the wall at that point. If the condition of the hock requires it, these changes will continue until the ankle has formed an angle with its apex in front, and the length

and direction of the wall at the heels will correspond to that of the toe and is known as a club foot. But this change in the contour of the limb necessitates other changes. What about the flexor tendons whose ability to perform their work of flexing the limb depends upon their power to contract, but by raising the heels we have shortened the distance between their points of attachment, which is equal to increasing the length of the tendon and it becomes necessary that they be shortened and as they are shortened, they become thicker and this is the condition so often mistaken for a cause of knuckling.

As it has been admitted that injury to the tendon will cause knuckling, I wish to remind you of what was previously said. Where the injury is the cause, heat, swelling and soreness will always be present and the knuckling is the result of the animal's efforts to relieve the work of the tendons by shortening the distance between their points of attachment, while the thickening found in the other cases is never accompanied by any of these symptoms.

When a horse has been lame for a long time from the effects of a very large spavin, we expect to find all of these abnormal conditions of the limb below the hock, and do not hesitate to say that they are caused by the spavin, but while a horse continues to go sound, we look upon them as a group of conditions peculiar to that part of the limb below the hock.

Before saying more upon this subject of knuckling and its cause, it might be well to say a few words about spavin. Most veterinarians and nearly everybody who owns or drives a horse, think they can detect the presence of a spavin. To be reasonably sure of its presence they depend upon one of two things or both, either a bony enlargement on the inside of the hock that can easily be detected, or the character of the lameness, for but few owners think a horse spavined if he is not lame. But if one will carefully study the condition in all of its stages in several thousand horses, he will find that it presents a very interesting study. We will see animals not showing the slightest enlargement at the seat of spavin so lame that they cannot be driven off a walk. We will see others showing quite a large spavin, but slightly lame, while again we will find others with a spavin as large as a hen's egg going perfectly sound and performing hard work.

Of those going lame there are some that will start off on

their toe and drive entirely out of their lameness, while others of this class will continue to show some lameness, but the heels will come upon the ground after going a short distance, to again go off on his toe and very lame, if allowed to stand a short while; some will start off lame with the heels upon the ground and are slow to drive out of their lameness; some will start off lame with both heels upon the ground and continue lame, while others will start off sound and suddenly go very lame and continue so to the end of their journey, and likely for several days even refusing to put that foot on the floor when led out. This animal is likely to respond readily to treatment.

We have found among these animals a great difference in the condition and appearance of the hock, a great difference in the character and degree of their lameness. There was but one condition always present—that was knuckling of the fetlock joint. This will be present to some degree where the slightest lameness exists.

If this is the only one condition that is always present, may we not consider it as a symptom of spavin?

Some years ago my attention was attracted by this condition of the ankle. The thing that interested me most was the fact that many of the worst cases did not show the slightest lameness, while many others showing but a slight knuckling were very lame. For this reason it seemed impossible the knuckling could be the cause of lameness and must surely be an effect, but as lameness was not always present it seemed hard to associate the one with the other. However, it became evident that when lameness was present, the cause of lameness always existed in the hock joint, while in many of the worst cases of knuckling, when no lameness was present, a well developed spavin could be found, and vice versa. Now this seemed a mixed up affair, for there were knuckled horses showing no lameness, knuckled horses showing no spavin and spavined horses showing no knuckling, but always a knuckled horse when lameness was present.

At about this time there came under my care a number of colts sired by a spavined horse. They were well-bred animals, with fairly long pasterns. Before reaching the age of two years every one showed a tendency to knuckle, and at the age of five years every one was knuckled and spavined. Those that remained free from lameness, the degree of knuckling remained

about the same, while those that went lame showed a rapidly increased degree of knuckling. These animals, having a small and finely bred limb, rendered it easy to detect the slightest abnormal condition and a most careful examination failed to detect the presence of the slightest unsoundness below the hock.

A spavined horse going sound and showing no sign of knuckling will, if from any cause of injury to the seat of spavin sufficient to cause lameness, immediately go knuckled, and continue knuckled until the lameness disappears.

If a spavined horse going sound and free from knuckling, begins to show lameness, if the lameness is caused by the spavin, knuckling will always precede it. Should the ankle remain in its normal position, never treat the spavin for it is positively not the seat of lameness.

As we know, a large percentage of spavins, some of which are very large, never cause lameness, while again many very small and some obscure ones cause intense lameness, we are, therefore, compelled to recognize some influencing factor other than its size. We all know that it is possible for a spavin to develop to an enormous size and never cause a minute's lameness. While it may be hard to explain these things, the fact remains that the proof is before us, so that while dealing with this condition, we must confine ourselves to a study of the symptoms as manifested by the animal itself.

We may not know why some horses go sound with a large spavin and lame with a small one, but there are some things we do know, for the animal tells us as plainly as it can be told in the sign language. The trouble is we are not familiar enough with their language. However, we understand their reason for doing some things, for every animal will do the same thing when the same cause exists. For instance, if a spavin hurts a horse to the extent of causing lameness, that animal will invariably adjust the limb to a position where the weight is thrown more in the direction of the toe. His first move in an effort to do this is to change the relation of the bones at the ankle.

This is absolutely necessary for he is powerless to change the direction of the weight on any part of the limb unless he first changes the relation to each other of the parts that support the weight.

If the soreness increases, as manifested by the degree of lame-

ness, a further change in the position of the bones at the ankle (increased knuckling) becomes necessary, this to be followed by the high heel, thickened tendon and other conditions seen in chronic spavin lameness. Of this group of conditions there is but one that can be designed or controlled by the animal—the displacement of the bones the condition known as knuckling. He is surely powerless to control the growth of the hoof or thickening of the tendons.

If high heels and thickened tendons are recognized as conditions that contribute to the comfort of the animal suffering from the affects of a spavin, and admitted that their presence is caused by, and secondary to, the knuckling, then we are compelled to accept the knuckling as the one and only symptom and the other conditions as an effect.

This makes it easy to account for some things that at first seemed difficult to understand, such as the presence of knuckling in the absence of lameness, or when a careful examination of the hock failed to reveal the presence of a spavin. For when we remember that many horses with very large spavins go sound with their ankle in a normal position, showing that no relief to the limb was necessary, it is only reasonable to think that others suffering a sight soreness could be relieved to the extent of going sound by a slight knuckling. If a slight knuckling relieves a slight soreness at the seat of spavin, then the degree of knuckling would depend upon the severity of the soreness.

If the soreness be sufficient to cause a slight knuckling at the time when it first begins to form and the development of the spavin checked, the degree of knuckling will remain the same. This condition is often seen in young horses. If a spavin can be relieved by knuckling, and the degree of knuckling controlled by the will of the animal, why is it not possible under some conditions for the relief so given to permit of the full development of a spavin without the animal showing lameness as shown in cut No. 1 and seen in many animals? The knuckling of these limbs continued to increase, the spavin continued to develop and the animal continued to go sound, while performing his regular work. Everything seems to be nicely adjusted to the requirements of the conditions he was subjected to, but when the animal through play, kicked both hind feet into the air, the jar occasioned by the weight of his body, when his feet

were returned to the ground, passed through the limb in a different direction from that occasioned by work, with the result that he immediately went lame.

It is not uncommon for knuckled horses to suddenly go lame, and if the cause is at the seat of spavin, the degree of knuckling will immediately be increased.

I have nothing new to offer in the treatment of spavins. The form of shoe we apply will be referred to later. It is better to try to prevent this condition than relieve it, and if knuckling can be accepted as a positive and never-failing symptom of an approaching spavin, it will prove a long stride in that direction, as it will permit of our removing the effect by treating the cause at a time when no other manifestations of its presence can possibly be detected. This might result in preventing the development of many spavins, lessen the degree of knuckling and number of knuckled animals. It is generally acknowledged that a spavin is caused by too much strain being thrown upon that part of the limb, as a result, either of a peculiar or abnormal conformation of the parts, from some hereditary cause, but more generally by an unbalanced limb.

When caused by the former, not much can be done to relieve it, but if caused by the latter, very much assistance can be given. For the amount of work performed by any part of the limb is influenced by the shape and position of the foot, and in many cases where spavin lameness is present, the lameness can be relieved often permanently, by simply adjusting the weight.

The method usually employed to relieve a spavined animal is the application of a shoe with a thick heel, but this is only contributing to the relief of a condition that now exists, and could not be useful as a means of preventing it. It seems very necessary that we make a nice distinction between the two for the reason that many of us think that that which will relieve a condition, if employed sooner, might prevent it.

Horses that develop spavins are usually seen to stand high on the inside with the weight passing through the foot in the direction of the outside toe, and for the reason that spavins usually develop very slowly, it is hard to determine if this is a cause or an effect. While trying to determine this it is well to bear in mind that those animals with a foot with the outside wall nearly vertical from the heel to the outside toe are usually, if not always, spavined. Again, with a horse when first

showing lameness, if he stands low on the outside, as is usually the case, he will often be relieved by raising that side of the foot. This coupled with the fact that we know the voluntary displacement of the foot, when seeking relief, is forward as shown by the knuckling and high heels, leads me to look upon it as a cause.

If a low outside be accepted as a cause, it would be well to shoe him in a way that will not only place the limb in a balanced position when first shod, but cause it to remain in this position until he requires shoeing again.

Cut number II shows the hind limbs of a horse that was used for saddle work nearly every day for twenty-two years. During the last eighteen years of that time, I lived on the block where he was stabled, and saw him in use many times during each week. All of this time the animal went sound behind.

The position of both ankles corresponded to the position of the right ankle, as seen in the cut; and while the wear on the shoe was greater in the direction of the toe, the hoof retained its normal shape. The inside of both hock joints were smooth, but slightly "rounded," and he would be a brave, but indiscreet man, who would attempt to convince the owner, or any horseman, that this animal was spavined in both limbs.

One morning, following his average drive of the day before, he was found in his stall so lame in the left hind leg, that he refused to do more than touch the toe to the floor when compelled to move.

The position of his ankle was now very much flexed, as shown in the cut. The ankle was placed under treatment for three weeks, by the owner; as he showed no improvement and was about twenty-seven years old, it was decided to have him destroyed.

I saw him for the first time, since getting lame, passing my place on the way to be destroyed, asking that he be left with me for an hour, which was done. I immediately took the picture as shown in cut number II and then cocained the seat of spavin; in twenty minutes took the picture shown in cut number III.

The lameness was now very much relieved, and as shown in the picture, the knuckling very much reduced.

After the animal had been taken a distance of about one-half a mile, the owner called me up on the telephone, saying the horse was going sound, acting like a two-year-old, and he did not think he would have him destroyed. Upon explaining the

Figure I

Figure II

Figure III

Figure IV

case he decided to have him put to death, and I got the limb. Upon dissection, the condition of the tarsal and metatarsal bones on the inside of the joint, would cause one to wonder how this animal had continued to perform work without showing lameness.

I have already overtaxed your patience, but feel that I would not be fulfilling my obligations as a veterinarian, if I permitted this opportunity to pass without saying a few words about the use of the old fashioned three calked shoes, which I consider responsible for more spavined horses than all other conditions combined.

The broad quarters of the unshod hoof provides the limb on either side with sufficient support to prevent its rotating in that direction, but place a three calked shoe upon a table and attempt to rotate it, and you will find that absolutely no resistance is offered to its displacement in the direction of either side. How could there be?—as the support, provided by the shoe, corresponds to the length of the toe in front and the distance between the two heels behind. It robs both sides of the limb of every particle of its support. There is no one who can deny this statement, and unless we are prepared to prove that support at that place is not essential to its health and comfort, there should be a law passed prohibiting the use of such a shoe.

I consider it a waste of your time to dwell longer upon this subject. The evidence of the injurious effects of such a shoe is too apparent to make it necessary to point it out to this intelligent body of men, but one cannot help but expressing surprise that we, as veterinarians, have not taken a more active part in trying to abolish their use. The long and continued use of these shoes can only be accepted as proof of the amount of suffering they have caused millions of horses, as well as a loss of service to their owners, and cannot be offered by us as a reason why their employment should be longer continued, when conscious of their injurious effects upon the limbs.

When a horse is lame in the hock, I always apply a shoe as shown in cut number IV. In very many cases, when the animal first goes lame, no other treatment is required, and my experience along this line with hock joint lameness, has convinced me beyond any question of doubt, that the support provided by the two calks situated under the quarters, is essential to the comfort of the limb.

SUMMARY.

That breaking over (stumbling behind) is always caused by a slight knuckling when the weight comes upon the limb. That knuckling is always present when there exists any condition of the hock joint, at the seat of spavin, which renders that part of the limb unable to perform its work with comfort.

That the absence of knuckling in cases of lameness behind can be accepted as proof positive that the cause does not exist in the region of the inside of the hock joint no matter how large the spavin is that may be found there.

That the absence of support under the quarters is responsible for more hock joint lameness than all other causes combined. That there exists on the inside of the hock joint of seventy-five per cent of all horses, more than six (6) years of age, an abnormal condition, the result of strain, which renders that part of the limb less able to perform its work.

Now gentlemen, I thank you for your attention and display of patience, knowing well that I have said some things that seem radical to many of you, but I solicit your careful investigation of this subject and assure you of a willingness to abide by your findings and concluding by asking this Association to appoint itself as a committee to determine the effects of three calked shoes upon the limbs of horses; further, if in the opinion of the investigators the use of these shoes are as injurious as claimed by me, that this Association at their next regular meeting, if they deem it wise, take some action to prevent the use of any form of shoe that does not provide the sides of the limbs with support equal to the support offered by the quarters of the unshod hoof.

DISCUSSION.

Dr. Blattenberg: Dr. McDonough apologized for his seeming inability to bring a subject of sufficient merit before this body but after hearing his well prepared and interesting paper we can not understand why an apology should have been offered. I agree with the doctor that one of the symptoms of spavin is "knuckling" none the less we notice spavins, possibly those located well back on the first and second tarsal bones, with nearly all the characteristic signs of lameness and no perceptible variation between the obliqueness of the sound from the spavined leg from the fetlock down. Without taking exceptions to the claim that knuckling is a symptom of spavin it must be admitted that it is a condition noticeable in other forms of lameness, generally higher up and especially in

obscure types or accompanying traumatic conditions as certain fractures of the hip, etc.

The toe extending beyond the center of the perpendicular metatarsal certainly has more leverage upon the lame parts than if the metatarsal extended to the floor with its straightness unbroken by a joint as one long straight bone. Tendons put to great tension in a continued effort to keep the leg straight, in time become more developed or thickened and there is an associated change in the shape of the foot noticeable at the heel. This position being assumed under so many lamenesses of the hind leg I am unwilling to confine it solely to conditions involving the hock as it becomes manifest in so many instances with trouble anywhere from the sole of the foot to the crest of the ilium. Changes take place all along this structure of bone, muscle, ligament, and the many other parts nature has so wonderfully designed in the building up of the hind limb which is beautiful in its mechanical structure; its pulleys, levers, articulations, lubricating appliances, weight bearing and suspending facilitates, its arrangement of angles for producing power, leverage, density and strength of parts which are so delicate in texture, and yet nothing superfluous being added. In all it is a wonderful piece of strength and handled with remarkable precision and dexterity.

Referring to the shoe which is a necesary evil and usually put on as a three cornered support under the foot, I hardly agree with the doctor that such a shoe is responsible for so many spavins; while recognizing the natural support of the quarters of the unshod foot, if we compare it with a shod one, properly trimmed, it is discovered that the foot has the same bearing surface except the lateral support where the heel calks are a little farther back, thus distributing the bearing surface throughout the circumference; we must not, however, overlook the unevenness the foot comes in contact with at each step when it takes weight. The lateral movements of the foot permitted by the joints below the fetlock seems to have been so designed as to accommodate or adjust the foot to the uneven support it receives at every step, while the foot is taking weight on the road. The alighting of the foot and receiving weight should be no more of a taxation upon the hock joint than the propelling force of the limb to carry or throw the body forward, for the leg with an unsound hock to receive weight must be very painful from the sudden flexion of that joint by the strong contraction of the metatarsal muscles, especially if sent with any rate of speed, its tendons being attached below and so close to the hock requires considerable pressure on the joint to bring such a pendulous-like lever forward for the foot to again receive weight. This seems to be the reason for dragging the toe of a spavined leg thus avoiding, to a certain extent at least, the pain consequent upon the sudden contraction of the metatarsal muscle; this movement similates very closely the involuntary action resulting from sprain or injury to this muscle. With a high heel and a low toe this painful act of receiving and carrying weight as well as propelling the body forward is greatly lessened. If the sound leg be similarly shod that is, with high heels and rounded toe it breaks over sooner, lessens the period of weight bearing and thereby

renders less promihent the difference in action between the sound and the unsound limb.

Having been assigned to respond to Dr. McDonough, I made several inquiries of veterinarians who have had considerable city practice with ample opportunity to observe the development of spavin in horses that have never been shod. One man who had kept a record of more than one hundred cases extending over a number of years, reported that the majority of these animals were deficient as to strength and quality of limb about the hock joint, whereas some were apparently strong in the hock; the latter were young, three to five-year-old horses. Another man reported about two hundred of a similar age that had been running unbroken and unshod on a breeding farm and of that number about fifteen per cent had spavins or other defects of the hock. The most of these animals were faulty in conformation and the feet had not received attention.

If we consider the type of horse especially susceptible to spavin it will be found more common in the spirited, speedy standard-bred or thoroughbred horse whereas the phlegmatic draft types suffer less from this comparatively common lameness. I agree with the doctor that if spirited animals were shod in such a way as to raise them on three high calks spavin would be far more prevalent than at present, but the race track is more free from uneven and hard surfaces than city streets. The nearer the foot is kept to the natural condition, shoes no heavier, with calks no longer than necessary may be the explanation why horses taxed as to motive power have fewer osseous lesions and greater display of weakness in their softer structures. Another potent reason why race horses are more free from spavin is found in the fact that as soon as the horse shows any signs of lameness complete rest is given and such inflammation as has become established as a result of a sprain usually subsides without leaving any appreciable changes in the joint.

I further agree with the doctor in raising the heels of the shoe and shorting the toe in any stage or degree of "knuckling," whether it be cause or effect and the angle of the shoe should be placed according to the extent of the condition. We regard the adjustment of the shoe as essential as any part of the treatment of spavin and it should receive immediate attention if the animal is required to remain in service.

We can hardly agree with the doctor that if the foot on the lame leg is lower and the shoe is worn more on the outside it must be evident that the adductor muscles place the foot in that position to carry weight because it is done with greater ease for the same reason "knuckling" by raising the outside wall of the foot with the shoe possibly lessens pain of the inflamed hock joint. This adds very little to the relief of pain unless it be accepted that the low outside heel be the cause and not an effect.

In accepting the doctor's summary it is with this exception: There is an occasional case of spavin that does not bring about "knuckling" as a source of relief, and "knuckling" is a source of relief to other lame or sensitive parts above the hock.

Dr. Joseph Hughes: Mr. Chairman, not having heard Dr. McDonough's

paper in its entirety it may seem presumptuous on my part to say anything on this subject. If, however, you will tolerate me a few minutes I shall give you a few impressions regarding knuckling behind, which one gains in city practice. Probably the conditions or causes giving rise to knuckling at this situation are the same wherever we examine them—be it in the city, suburb or country.

In cities the observant practitioner has opportunities of seeing and studying not only pronounced lameness in many of its forms, but, if he is interested, or critical, he observes as horses are met with and passed by on the streets, various distortions of limb or foot, or defection of gait, which do not amount to lameness. Perhaps the most common distortion of all seen under such conditions, is knuckling—volar flexion of the fetlock. Observations of this kind are interesting and instructive, but under such circumstances they are merely casual and one has ordinarily no opportunity of determining the cause of such distortion by examination.

When, however, opportunity presents itself for such examination, the cause will in my opinion, with by far the greater frequency, be found behind and below the level of the fetlock joint. The posterior ligaments of the pastern, the X, Y and V ligaments, the lateral ligaments of the pastern, or coffin joints, are usually the seat of irritation and a slight or pronounced thickening with shortening of these textures is present. Less frequently an old standing diseased condition of the navicular bursa from an aseptic nail puncture is the cause.

We are, of course, aware that knuckling at the fetlock may appear and run concurrently with other conditions than those mentioned. We observe it as one of the earliest symptoms in spinal meningitis and in sclerosis affecting the lumbo-sacral bulb of the cord, in psoas strain, in crural paralysis, in certain tendon and ligamentous lesions related with the os calcis, in connection with spavin, and many other conditions, so that while in such cases as in affections of the spinal cord, as a diagnostic symptom knuckling is valuable, still on account of its association with many and varied lesions, it requires to be closely weighed in making a differential diagnosis.

Those who seek its cause below the fetlock, will, in my opinion, be most frequently successful. There is abundant reason for this: The heavy heel and particularly toe pieces on hind shoes and their tendency to become engaged in spaces between fixed objects, such as granite blocks, destroying all pivotal motion between the toe of the foot and the ground, causes extraordinary tension of the lateral ligaments of the ginglymoid coffin, pastern and fetlock joints, inducing strain.

Worse still are the results of an uneven paring of the hind feet, the inner heel quarter and toe being left ordinarily with much more horn than the outer, the weight bearing as a consequence is not evenly distributed over the digit or foot. This produces an excessive tension on one side and a relaxation of the lateral ligaments of the digital articulations on the other; thus inducing irritation which the horse often tries to relieve by knuckling at the fetlock.

It must not be inferred from these remarks, that my belief is that

knuckling is absent in spavin. My contention is, that as a symptom of this condition it has no significance. The same causes mentioned as producing lesions below the fetlock may induce spavin. The excessive amount of horn constantly left on the inside of the average horse's hind foot and which we also see with such regularity on the unshod foot of the four or five-year-old horse when he comes to market, may induce lesions of both pastern and hock, so that there is nothing unusual in finding ringbone or spavin in a young growing colt before he leaves the farm.

How often do we find a horse lame in a hind limb, which on examination reveals both the pastern and hock involved; the one with ringbone, the other with spavin and after making a futile effort to determine which was responsible for the lameness we decide to submit both parts to treatment. In such a case, Percival, the old time brilliant writer, would hint at "osseons effusion." The theoretical veterinarian of today would debate the question of hereditary predisposition, evolution, or rachitis. The practical veterinarian would conclude that the joints were violently strained, or injured in some manner and let it go at that.

Veterinarians, horse shoers and laymen who have given the subject of the foot and its shoeing deep thought, can, and do correct many of the faults affecting it before these faults produce disaster in distant situations—in situations sometimes so distant that their connection with the foot is difficult to trace.

Robert Bonner scholar, thinker, journalist, and horseman that he was, working in concert with Roberge, the horse shoer, has given us a little volume bristling with facts and errors, and veterinarians who take the trouble to sift the wheat from the chaff in this work, will be rewarded by getting many sidelights on the subject discussed here, as well as on the entire subject of distortions of limbs and impediments in locomotion.

Doctor McDonough: Referring to Dr. Blattenberg's remarks concerning the uneven ground, of course that is a condition we have to contend with but it cannot be advanced as a reason why a further rotation of the hoof to the side, should not be prevented, for there is surely no time when the limb suffers as much from the absence of support at the quarters as when its equilibrium has been disturbed through the hoof coming in contact with an uneven surface.

The doctor spoke of lameness caused by the strain imposed upon the hind limb. As they are the propelling levers of the body, that is true, but such lameness can only result from the presence of conditions caused by the strain which is intensified by the absence of support at either side.

He referred, also, to the presence of sprains of horses that had never been shod; I want to ask you gentlemen, in all fairness, how many horses you have seen that had never been shod that did not stand high on the inside? Whether this be a cause or an effect, I am not prepared to say, but that the one is dependent upon the other seems likely from the fact that this same condition is always present upon the feet of spavined horses that have been shod.

The statement of Dr. Hughes that he had seen knuckled horses that showed no cause of knuckling, and were not spavined, surely lessens the

value of this condition as a diagnostic symptom of sprain, for Dr. Hughes' professional ability is such as will cause any of us to hesitate before taking exception to his views upon any subject pertaining to lameness as applied to the practice of veterinary science; in-as-much as the doctor has admitted, however, that no other cause of knuckling was present, unless he considered the knuckling a cause, how does he account for its presence? If he admits that it is an effect, and that he was unable to find the cause how does he know that the trouble did not exist in the hock? The doctor says that ringbone will cause knuckling, but to know that you must be able to detect the ringbone and then this will include it in the group of conditions below the hock referred to in my paper.

One of the speakers stated that he does not know how horses in New Jersey act but that horses in Chicago go knuckled in the absence of any cause—just simply go knuckled. I don't know anything about Chicago horses while they remain in Chicago, but I do know that they wait until they are convinced of the presence of a cause before they walk knuckled in Jersey.

Dr. William Dougherty: Mr. President, I would like to say a few words on that point. About forty or forty-five years ago there was an eminent gentleman in this country who wrote a great deal about the horses foot and about having a level surface, he considered that all lameness was caused by a horse's foot not being level, indeed, he was crazy on the subject, and had a large number of followers. His name was Robert Bonner. It appears to me that a large number of veterinarians since his time have also been crazy on the subject of the horse's foot—they always advocate the leveling of the foot. I have yet to find a veterinarian or blacksmith that takes into consideration the conformation of the horse, whether he is bow-legged, pigeon-toed, or wing-footed, or if he has other malformations of the hind legs, for instance, when being bow-legged the legs are wide apart, but the feet close together. Such a horse will wear the shoe down on the outside of the foot, while the inside is scarcely worn at all. Level such a foot, put on a level shoe and the animal is in misery until the shoe becomes worn down upon the outside as it invariably does. Such a horse should always be shod higher on the inside.

Again we observe the horse that stands with the points of his hocks together, the legs touching one another to the ankles, the toes separated, pointing out; also, do we see an animal with one straight leg and one that wings; a horse with one leg longer than the other, the latter the result of faulty formation at the symphysis pubis. Besides these, other faulty conditions may be found.

In the front limb we observe striking of the inside of the foot on the ground first, (the horse that always has bad corns); the knee knocker or the horse that wings one or both feet in, the wing-footed horse and so on can we cite other faulty conformations not one of which is due to the hoof proper, but even so, the hoof or foot is always treated in an endeavor to correct such malformations. Many such horses have been treated by either a trainer or blacksmith before the veterinarian gets a chance and the feet have been cut down, the walls rasped away so that the horse goes lame or sore.

It is the duty of the veterinarian to look at the conformation of the horse, examine him in all his gaits, on the halter and in harness at all speeds before undertaking to correct the foot. Nearly all young horses that come to the city are sound. If he is a draft horse he is shod with high heel and toe calks all around, if a driver with heel calks only and owners sometimes insist on longer calks than the blacksmith would put on with an idea to make them wear longer, so the trouble begins. Atrophy of the frog, sprung knees, knuckling of the ankles, spavin, ringbone and other troubles develop as a result of long calks.

In treating the sprung knee and knuckling of the ankles I have had good success by putting on high toe calk, no heel calks, and blistering the flexor tendons along the back of the knee; for the hind leg blistering all around the ankle. The last case I treated for knuckling, about four years ago, goes sound and looks well today. Another cruelty to the horse that is in general use with the blacksmiths today is to shoe the horse that interferes behind by placing a toe calk and a heel calk on the outside with no calk whatever on the inside and in this manner causing many horses to become lame in the ankles.

STERILITY IN CATTLE.

By W. L. Williams,

Ithaca, New York.

The subject of sterility in cattle is one that grows in importance to us not only as their value increases but, also with the increase in improved breeding, close housing, and through keeping them in larger and larger herds; moreover, sterility in the great dairying states is rapidly assuming great importance from the standpoint of national economy. In many herds in the United States today the sterility among valuable animals reaches as high as fifty per cent and over. It is not confined to the Atlantic seaboard for I have correspondence from the Mississippi Valley and Pacific Coast where valuable herds of cows show as large as fifty per cent of sterility. In the East I am at present handling a herd of imported Jersey cows in which more than fifty per cent of the animals have come under my charge for stubborn sterility during the past year. In almost every dairy herd we find that there is a constant loss from sterility and in the average herd, where I have statistics, that loss ranges from five to ten per cent year in and year out. Many of the animals prove not only a total loss but more than that, because a great many animals are kept in a state of sterility for two or more years producing no milk, producing no young, and when they finally have to be abandoned and sent to the butcher they have no value worthy of mentioning. Thus our subject grows in importance with the development of our cattle industry.

This sterility is not confined to dairying cattle alone for I have found upon inquiry that some large herds of beef cows are practically ruined where abortion had broken out and, following the abortion or accompanying it, it was found impossible to get a large proportion of the animals to conceive.

In handling the subject of sterility we need to take into account the entire genital system as well as the body as a whole. We shall not try to cover the subject of sterility as it is entirely to vast, but limit our talk to the subject of some of the more com-

mon diseases of the genital organs of breeding cattle which bring about sterility.

In order that an animal may breed, bear in mind, she must have healthy ovaries which shall give off healthy ova; that the oviducts must be open so that the spermatozoa may pass up through them, fertilize the ovum, and the ova in turn pass through them to the uterus, to find a suitable ground for development in environment free from disease, or approximately so.

We will begin therefore with illustrations of the ovaries of a pregnant cow. (A series of over thirty lantern slides were thrown on the screen illustrating the healthy and diseased genital organs, brief explanations of each being given. It is inexpedient to reproduce all the illustrations. A few typical ones are submitted and the remarks of the speaker so modified as to adapt them to the absence of the illustrations.)

Figure 1 illustrates the character of the ovary of pregnancy. we have placed these ovaries in pairs, except the single ovary marked P. 23, showing in each pair a corpus luteum, or yellow body of pregnancy. The corpus luteum forming at the place where the ovisac is ruptured, is in general even, and the ovarian epithelium is extended over it. They vary in form, generally oblong, some spherical. In a recently ruptured ovisac, no corpus luteum is present but only a ragged, bloodstained cavity; they measure ordinarily about five-eights to three-quarters of an inch in diameter, are quite uniform and a little bit smaller in a heifer than in a cow.

The other ovary of each pair is in varying condition. There are sometimes cysts which have not, however, interfered with pregnancy at all.

The yellow body or corpus luteum is formed within a very few days after impregnation, so that it is only very rarely that the freshly ruptured ovisac is observed clinically; and in autopsies on the killing floor we only occasionally find one of the freshly ruptured ovisacs. The yellow body remains not only until pregnancy is completed and the animal has calved but after parturition, they remain till the animal again comes in heat, which in a cow is about thirty days after calving. In a diseased condition, especially of pus in the uterus, (pyometra), they remain almost indefinitely during the existence of the disease. When they vanish they disappear rapidly, are generally of a lemon or orange color in pregnancy but varies somewhat, and we sometimes see

freaks. After a time it disappears to a very small spot and then the animal again comes in heat. Sometimes the corpus luteum is quite pyramidial, but the dome is rounded, though as a general rule it does not depart greatly from the spherical. The specimens from which figure 1, P 18 and P. 19 were photographed may have been compressed in preservation which make them appear somewhat more oblong than usual. The location of the yellow body is often such that it gives to the ovary a markedly conical appearance as seen in P. 21. Some are complete spheres, but these forms are rare. As a rule they do not vary in size and are generally even in contour.

In two specimens obtained from more than three thousand cows and heifers we met with freaks in color; instead of being yellow bodies, their color suggests corpora nigra, or black bodies. They are really blue black in the specimens. One of these is greatly enlarged so that it is four or five times as large as the other corpora lutea. In cases of twins there is usually a corpus luteum in each ovary, or two corpora lutea in one ovary. Very rarely we find twins coming from a single ovisac, with but one corpus luteum.

In the ovary of non-pregnancy (figure 2) we observe a corpus luteum which is very like that of pregnancy in many cases, especially of animals which are, perhaps, sound but have not been bred, or from some accident have not conceived; we have in these a corpus luteum which may be somewhat too large; as in N. 4, N. 8 and N. 9.

In N. 3, we see a corpus luteum in which it is almost impossible for the animal to be pregnant; the corpus luteum projects too much, and it is too abrupt. We would be sure that neither in N. 1 or N. 2, is there a corpus luteum of pregnancy because of the cysts in their center from which we know that we are dealing with a corpus luteum of sterility. The corpus luteum shows a strong tendency to become cystic as indicated in figure 3.

In the ovary of non-pregnancy, the corpus luteum may look very like pregnancy, but frequently the yellow body projects far beyond the ovarian surface in a very characteristic manner, as in S. 2, S. 3, and S. 5, or it may be deep-seated like S. 6, sunken down in the central part of the ovary as we see occasionally in pyometra.

We can ordinarily note upon rectal palpation indications that the animal is not pregnant. One of the most notable changes in

sterility is the development of a cyst in the corpus luteum, which is very frequently associated with some change in the form of the ovary, shown in figure 3. When the veterinary surgeon upon rectal palpation feels a protruding corpus luteum like S. 2 or S 5 which feels soft and is naked, he may know that the animal is not pregnant although the period which has elapsed since the last copulation is too short to determine whether or not an embryo actually exists in the uterine cavity; such we know as a naked, protruding corpus luteum as it does not have the ovarian epithelium extending over it. The center of the corpus luteum begins to undergo cystic degeneration, sometimes at one point, sometimes at another, faint at first or simply a mere suggestion. Once cystic degeneration of the corpus luteum has begun it gradually extends, the cystic contents gradually destroying the luteum or yellow tissue until there finally remains a mere yellow girdle, of varying thickness; finally, all trace of lutein tissue vanishes and a complete cyst remains, which may or may not rupture, according to the thickness of cyst walls.

Usually the cystic yellow body can be very readily distinguished by rectal palpation and is simply and easily pressed out with the thumb and finger. An ovary may contain a second, or third cyst and the other ovary of the pair may on may not be simultaneously diseased. In many corpora lutea of sterility there is observed a hemorrhagic spot as seen prominently in S 2, S 3 and S 5, figure 3, causing the projecting portion of the yellow body to be black in color, soft and flabby to the touch. Sometimes this hemorrhagic spot is immense and may have an enormous corpus luteum. One in my collection is two and a half inches in diameter as against the normal five-eighths or three-quarters of an inch; such a condition can be very readily recognized by rectal palpatation. Very frequently this form of corpus luteum is the cause of the failure of the animal to show estrum and for months one of the ovaries carrying the corpus luteum will prevent the animal from ovulating and from coming in heat at all. In another specimen the corpus luteum with its cyst and blood clot is about three inches in diameter as against the normal five-eights.

When a corpus luteum acquires the degree of cystic degeneration shown in figure 4, it may be recognized as either a corpus luteum or a cyst, and the surgeon is put to his wits end to tell which it is until he attempts to force it out. In the great majority of cases the cyst will rupture and afterwards upon second

squeezing of the ovary the lutein tissue will press out falling away in such a manner that its departure from the ovary can readily be recognized.

As a result of the repeated formation of yellow bodies followed by cystic degeneration there gradually developes either a very large cavern as in S. 7, or a number of cysts as in S. 9. The cysts may gradually grow distending the ovary to great size, so that we meet with cysts two, three or more inches in diameter still showing at their periphery, traces of lutein; more rarely the cysts become enormous reaching a diameter of six, eight, or more inches. Whenever a cyst increases, (figure 4), to from one, to two inches in diameter there is a tendency towards bulling or nympomania, a condition in which the animal is sexually crazy.

It is interesting to note that the influence of the cystic degeneration of the yellow body or of the cystic degeneration of the ovisac, which has not been ruptured, is dependent to some extent, apparently, on the size of the cyst. A small cyst of one-half to one inch diameter does not invariably cause interference with pregnancy but when they reach a medium size of one inch or more, they seem to inhibit ovulation from both the affected and normal ovary. When they attain a diameter of six to eight inches they do not seem to interfere with the function of the other ovary; the largest cysts I have in my collection have come from pregnant animals. It seems that cystic degeneration reaches a certain size and tension at which it interrupts the normal function of the ovary, causing either nymphomania or an absence of estrum, but when it grows very much larger it destroys all function in the affected ovary, as there appears to be no reflex action on the other ovary and the animal may accordingly go on and breed.

In many of the severe cases of diseased ovary there occurs a dropping down of the broad or sacrosciatic ligaments of the pelvis, as at the time of parturition, consequently many of the bullers of a herd may be picked out by walking along behind the row of cows. I have in my collection one ovary with a cyst an inch in diameter and by it a true corpus luteum of pregnancy. This possibly offers an explanation for the occurrence of continued heat despite the fact that a cow is pregnant. It is important that we should diagnose the pregnancy in such cases and be careful to stop breeding. Time and again I have made a diagnosis of pregnancy when the animal was two, three or four months

pregnant and yet were taking the bull every three weeks or possible oftener. I have always advised that such animals be excluded from breeding.

In regard to the ovaries of this type, I would say that in the large majority of cases they are subject to remedy and may readily be diagnosed by rectal palpation. Cysts can be ruptured by grasping the ovary with one hand in the rectum, lifting it up and carrying it backward over the roof of the vagina, reaching into the vulva through the vagina and pressing the ovary down into the hand within the vagina so it can be grasped between the thumb and finger; in this procedure the corpus luteum is pressed out into the abdominal cavity; in a great many cases this affords immediate relief, and the animal improves. In other cases it becomes necessary to follow up the handling persistently and carefully attempting to rupture the cysts as fast as formed, by so doing pressing out each unhealthy corpus luteum as soon as it develops. In this manner the ovary assumes its normal function and discharges a normal ovum.

Cystic disease of a corpus luteum, as I interpret it, is predestined when the follicle ruptures. Cystic degeneration of the yellow body in the corpus luteum of pregnancy is not observed, for in such instances it is always solid throughout. I cannot determine that cystic degeneration of the corpus luteum of estrum ever occurs. Assuming that we are dealing with disease of the ovisac, our plan is to hasten pregnancy by relieving the irritation. This is done by rupturing the cyst, thus pressing out the diseased corpus luteum, so that the affected ovary may function or that the sound ovary may function, after the inhibitory power of the diseased gland has been removed; again, I constantly advise that the vagina shall be kept as clear as possible of infection and although it is not possible to completely disinfect it, we should none the less wash the vagina frequently with weak antiseptics. At the present time, I use principally a weak lugol solution; usually beginning with a one-half of one per cent strength but frequently reduce the strength to one-quarter of one per cent, or after using it for a number of days or weeks sometimes find it best to reduce the number of applications. We may however, apply a one-half of one per cent of lugol's solution, once daily for two weeks without producing irritation. I believe we get great good from the combination of these two forms of treatment in handling this type of ovarian disease.

Turning to the oviducts, we meet with three prominent forms of disease, hydrosalphinx or dropsy, pyosalpin or suppuration, and tuberculosis. The first of these is the most common of the group, the duct being tensely stretched producing a number of saclike cavities, the contents enormously distending the entire oviduct completely blocking it. The ovary may be sound but the oviduct is hopelessly blocked by the disease. This hydrosalpinx is readily diagnosed by rectal palpation and when recognized on both sides all efforts to restore the breeding powers may as well be dismissed.

Abscess of the ovary occurs only rarely and when present the ovary is adherent to the board ligaments. Necrotic centers occur in the parts where suppuration is going on, destroying the ovary. Along with it, as a rule, there is more or less pus in the oviduct; that is, pyosalpinx is present. In palpating ovarian abscess per rectum the ovary is quite dense, sometimes we can feel a fluctuant part; the ovary is adherent and cannot be picked up as ordinarily or moved from one place to another; moreover, it lacks perfect clearness in detail. Unfortunately, as a rule, when one ovary is involved in an abscess the other is likewise affected and the cow becomes permanently sterile. The only thing the veterinarian can do is to make a guarded diagnosis, advising the owner to get rid of her as quickly as possible thus saving the expense of keeping. In several cases of this kind we have been able thus to advise owners who otherwise would have kept the cows for months or years, in the vain attempt to have them breed.

In rare cases we meet with neoplasms, or tumors of the ovary. Our collection contains one neoplasm that is four inches in diameter, and the capsule of the ovary is intact; the center is a soft hemorrhagic mass having all the general characteristics of carcinona. When diagnosed, if a safe diagnosis can be made, it offers a good opportunity for performing ovariotomy on one side, thus the animal might go on and breed from the other ovary.

I was very much surprised during my investigation to find how often but one ovary functions, and upon the killing floor have observed a number of animals with only one uterine horn, so that only one ovary can function, and each of those animals were or had been pregnant.

In pyosalpinx or suppuration of the oviduct, the tube may be

greatly distended forming a coiled mass one and a half inches in diameter, filled with pus; the pavillon of the tube adherent to the ovary and filled with pus which in turn entirely surrounds the ovary.

Pus in the oviduct takes on two distinct forms; the oviduct is either greatly distended with pus and the walls thinned and flaccid, or is not so greatly enlarged, perhaps only to about an eighth of an inch, tortuous and thrown into a coiled serpentine mass. In this latter type the duct is very dense and hard and readily recognized clinically by rectal palpation. In a pedigreed heifer which had never bred, a very marked hydrosalpinx was encountered and recognized clinically; both oviducts more than half an inch in diameter, alike and peculiar in that the end was away from the ovary. The fringes of the pavillon of the tube stand out like an open flower but not in contact with the ovary and not adherent to it. The end or abdominal opening of the oviduct was closed, so that fluid could not get out into the peritoneal cavity, and the other end did not discharge into the uterine cavity. On the lower surface of the uterus was an immense indurated abscess, the result of a layman's attempt to "open" a uterus which was not closed.

This heifer had a perfectly normal cervical canal; the vaginal end was quite normal and it had been shown that the cervical canal was open throughout because the heifer had regularly menstruated. Where blood may flow, spermatozoa may pass. The trouble with the heifer was the incurable obstacle in the oviduct which we diagnosed by rectal palpation as also the handling to which the heifer had been subjected and notified the owner that he had permitted somebody to try to "open the womb."

In either hydrosalpinx or pyosalpinx the disease as far as I know, is beyond hope, and we must say to the owner that the animal cannot breed, in-so-far, at least, as the affected side of the genital apparatus is concerned, for if one oviduct only is involved the animal may breed.

In pyometra, figure 5, we meet generally with a peculiar and characteristic type of corpus luteum, the central, sunken corpus luteum. Sometimes they are cystic but usually solid and somewhat atrophied, the corpus luteum sinking down deep into the ovary, clear away from the exterior, no longer projecting out like a normal corpus luteum of pregnancy but completely buried within the gland.

In diseases of the uterus the corpora lutea take a great variety of forms. In pyometra, with an associated granular appearance of the uterine mucosa like tuberculosis we generally observe that the corpus luteum is retained and that it will remain in the ovary so long as the pus in the uterus persists.

Much is said by laymen and veterinarians of "closure" of the os uteri or mouth of the womb. On viewing the vaginal end we do not see the opening and cannot insert either the finger or a sound through it but on making a cross section of the cervix in a normal cow and pulling the walls apart the canal is observed as a mere slit. On dissection the cervical canal is found barricaded by several transverse folds of mucosa. The canal is exceedingly tortuous and when attempting to force entrance through it there is very great danger of getting behind these mucous folds causing a rupture of the uterus. The cervical canal is always tightly closed in a normal cow except during estrum, just preceding or after parturition or abortion and this appears to be an admirable provision of nature toward preventing access to the interior of the uterus of the multitude of bacteria which are found resident in the vagina.

We meet with a variety of types of pyometra but as the normal uterus of the cow cannot generally be reached on account of the character of the cervix, it is impossible to wash it as in other animals and, therefore, we are forced to very largely confine treatment to the flushing out or disinfecting of the vagina and to pressing out of the ovary any retained yellow body. The pressing out of the yellow body was first prominently advocated by Hess, who asserted that this procedure would cause uterine contractions, evacuate the pus from the uterine cavity and bring about an autodisinfection of the organ. In my experience this has proven a very valuable means of bringing about recovery from pyometra.

The percentage of permanent sterility in uterine diseases is very high more especially because they do not come under our charge as a rule until suppuration has extended into the oviducts and then there is no way of reaching the seat of disease. Sometimes, we can introduce an instrument into the uterine cavity and wash it; whenever this is possible it should be done. Albrechtsen, of Denmark, in a paper read before the International Veterinary Congress at The Hague and also in a number of published magazine articles advocates washing out of the uterus,

but suggests doing so very shortly after calving and while the cervical canal is still open.

In some cases of pyometra, especially those that come into heat, an instrument may be introduced into the uterus with safety, and the organ washed out. Occasionally uterine hemorrhages are encountered. In a certain case following an abortion, the cow suffered during the night and the next morning, the attendant found her standing with vulva and tail bloody, and apparently quarts of blood scattered over the stall; subsequent examination revealed about eight quarts of clotted blood in the uterine cavity. Fearful of the renewal of the hemorrhage the clot was slowly removed, through allowing about a week to elapse before getting it all out. During the entire time the blood was fresh and of a bright scarlet color, there seeming to be something about it which resisted decomposition.

On the killing floor one occasionally meets with an old blood clot or hematoma of a black, tarry, and sticky nature filling as a rule the body of the uterus and extending into the horns, which seem to be capable of remaining in the uterus indefinitely and having no tendency whatever to undergo decomposition. One specimen obtained in the abattoir consisted of a large mass, an old hematoma, a pound and a half or two pounds in weight, appearing to occupy the entire uterus, but when dissected it was found, to our astonishment, to occupy but one horn while a normal fetus about six inches long was lodged in the other. This old blood clot had presumably formed immediately after the last pregnancy, had filled the one horn, but not the uterine body thus not interfering with ovulation in the other ovary nor with conception. It had therefore, acted as a simple non-irritant body, causing no impediment to impregnation and I think that some similar condition to this occurs in the ordinary case of mummification of the fetus. It can readily be diagnosed in the cow by rectal palpation and the peculiar mass possesses a doughy character.

I have spoken to you thus far of a type of affections which cannot probably be differentiated from the infection of contagion of abortion and the subsequent purulent infection of the uterine cavity; some of these are subject to remedy and others not. There is another interesting form of infection which causes sterility and which, although less common, is no less important to us as veterinarians: the sterility of genital tuberculosis.

Very rarely we observe ovarian tuberculosis; our collection having but one example. Tuberculosis of the oviduct or tubercular salpingitis on the other hand, is far more common; here the oviduct is coiled, nodular, hard, and filled with pus, the ovary hidden, encapsuled and very small. The broad ligaments of the uterus are filled with great masses of tubercules.

Cross sections of the horns of a tubercular uterus usually show at different points, tubercles in the wall, and pus in the uterine cavity.

Tuberculosis of ovaries, oviducts and uterus may generally be recognized or suspected by rectal palpation. The adherent encapsuled condition of the ovary, the enlarged, nodular oviduct and the tubercular character of the ligaments enable us to diagnose the disease quite safely even in some cases where the animal withstands the tuberculin test.

It has been my fortune to be called in consultation during the past year upon two bulls which became incapable of copulating. Each would mount a cow and protrude the penis for an inch or two from the sheath but could not protrude it far enough to copulate. Upon clinical examination of one of these bulls an enlargement was found near the base of the glans penis and upon cutting down on this a multilocular abscess, the several more or less distinct cavities containing thick pus, but no apparent calcification. An examination of the pus by staining revealed nothing, but a guinea pig inoculated with it died of tuberculosis. The abscess walls were removed as thoroughly as possible but they at once reformed and the bull never became capable of protruding the penis. Here were two prize bulls kept in herds supposed to be free from tuberculosis. In one of these herds a cow was bought on the tuberculin test and proved to be sterile; the owner had her served repeatedly by his very valuable prize bull and called me to examine her because of her sterility. Upon feeling an adherent ovary and an enlarged oviduct, I turned to the owner and said: "Do you know this cow to be free from tuberculosis?" He said: "Yes, she has passed two tuberculin tests." As the bull had tuberculosis he was destroyed and the cow was subquently sent to the shambles when upon post-mortem examination she proved to have tuberculosis of both the uterus and oviducts.

This particular bull had taken first prize in his class at the New York state fair the previous year and having repeatedly

served the cow with tubercular uterine catarrh, the infection had become transmitted to the region of the preputial ring and finally invaded the glands in the vicinity of the prepuce and thus ruining the bull.

I find it is not a rare thing for bulls to thus become disabled and the experience taught me a lesson in the value of rectal palpation of the genital organs. When I find an adherent ovary, with an oviduct enlarged and nodular, I condemn the cow and ask the owner to take her out of the herd regardless of whether she stands the tuberculin test or not; moreover, only a few months ago I met with just such a clinical case and advised taking the cow out of the herd. Upon post-mortem examination she proved to be tubercular regardless of the fact that she had resisted the tuberculin test.

Here then is a danger to which we have not heretofore given very much attention and one that is an important element in our fight against tuberculosis. In our numerous very valuable herds we cannot afford to use the poll-ax on every animal, but must carefully pick out tubercular animals. Great hazard is constantly incurred through allowing a valuable bull to serve a cow having tubercular uterine catarrh, and it becomes one of the important functions of the veterinarian who is specializing on the question of sterility to be able to detect by rectal palpation the oviduct with genital tuberculosis to thus exclude that animal from the breeding herd in order that she may not infect a valuable sire.

I have only touched upon a few points of this great subject, a subject that is growing in importance every day, and I thank you for your patience. (Applause.)

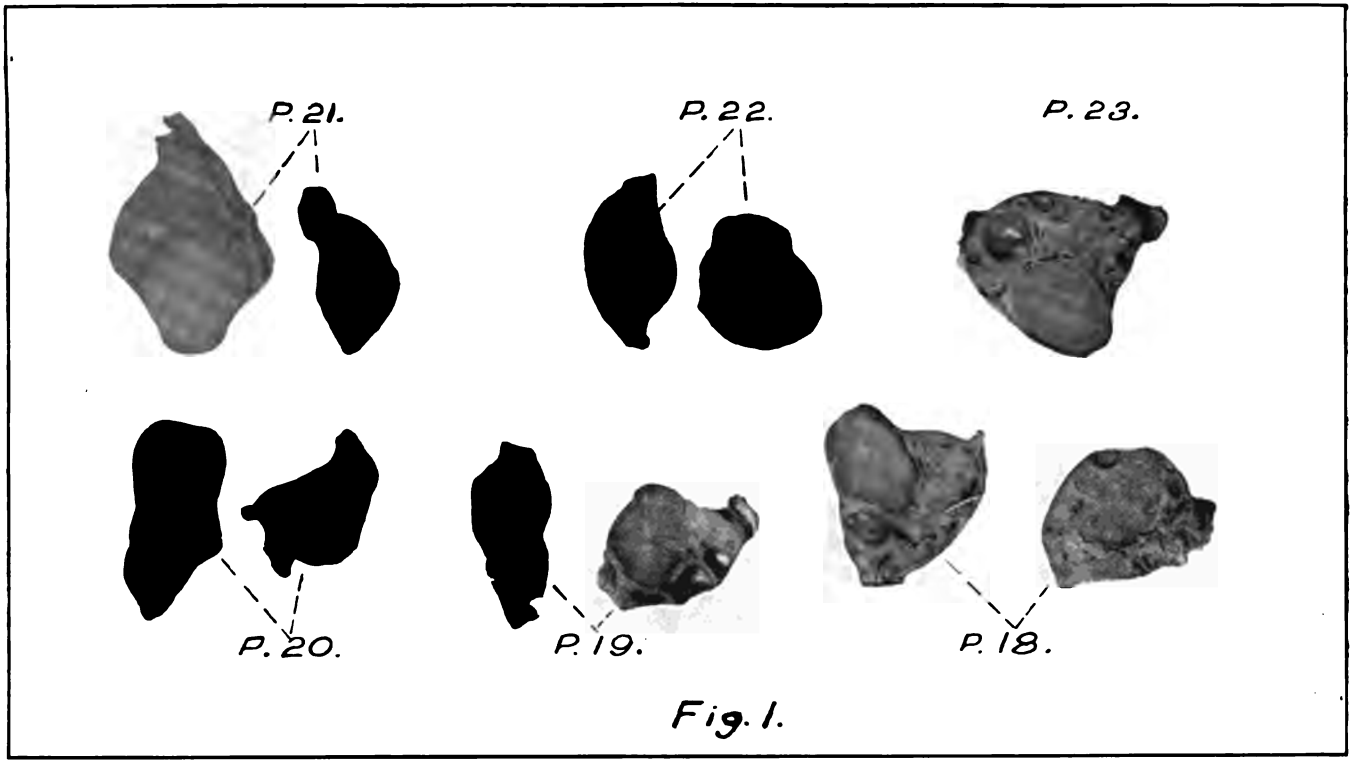


Figure 1. Ovaries of pregnancy, showing the corpora lutea of pregnancy. P. 20. The ovaries of a heifer with small, spherical yellow body. P. 19. A small yellow body of pregnancy distorted somewhat in fixirg. P. 18. Elongated yellow body. P. 21. Conoidal corpus luteum of full size (adult cow) showing the most common type of the corpus luteum of pregnancy. P. 22 and P. 23. Common types of yellow bodies of pregnancy.

It will be observed that in each case the corpus luteum is of uniform consistence throughout, except for traces of the seat of prior rupture of the ovisac, which is marked by an irregular scar of connective tissue.

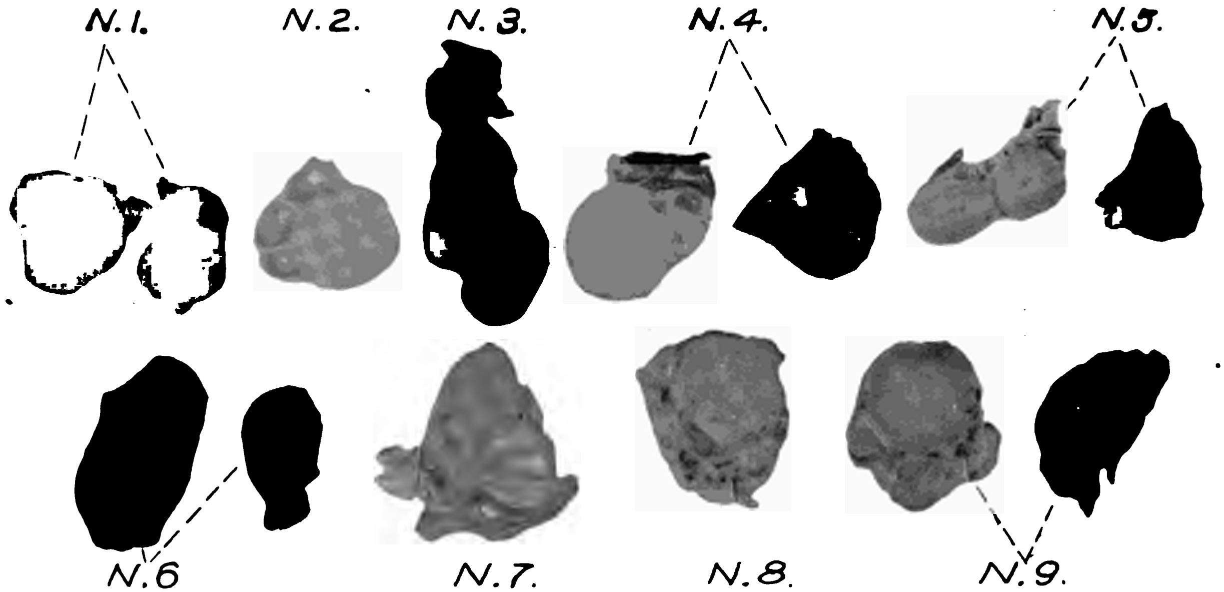


Fig. 2.

Figure 2. Ovaries of non-pregnant cows. N. 1. A corpus luteum of the form and size of the yellow body of pregnancy but showing in its center the beginning of cystic degeneration. N. 2. A corpus luteum normal in size and form for a yellow body of pregnancy. Presumably a normal corpus luteum of estrum. N. 3. The protruding, naked corpus luteum of sterility. The free end of the corpus luteum projects far above the neighboring ovarian surface, is shaped like a mushroom, and has a dark, hemorrhagic periphery. In rare cases the corpus luteum of pregnancy approaches this type but the ovarian epithelium stretches over it and the hemorrhagic appearance is absent. N. 4. Similar to N. 2, paired with an ovary containing two cysts of moderate size. N. 5. The ovaries of a heifer, one of which contains two corpora lutea, each of which shows the beginning of cystic degeneration in the center. Both bodies are abnormally small. N. 6. Similar to N. 2, but associated with a cyst while the other ovary of the pair is quite cystic. N. 7. An abnormally small corpus luteum associated with a cyst. N. 8. A common type of corpus luteum of sterility, normal in size and in form except for a small dome-like projecting tip which is hemorrhagic. N. 9. A spherical corpus luteum with a hemorrhagic pole.

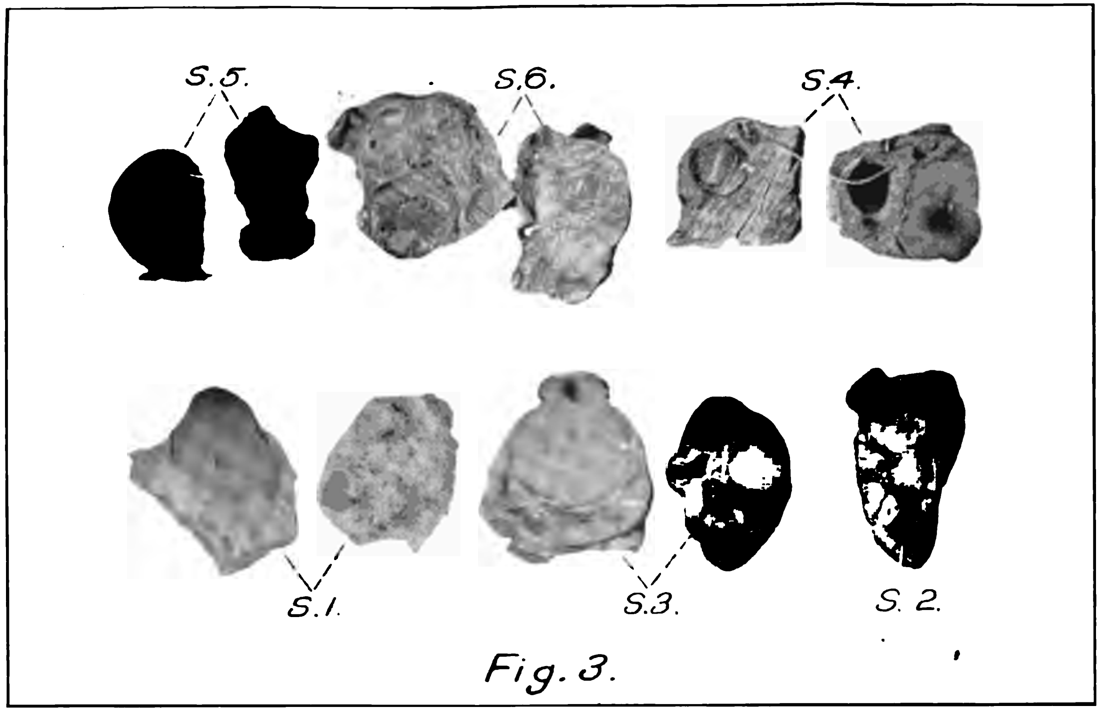


Figure. 3. Ovaries of sterility. S. 1. Corpus luteum of sterility, the dome of the yellow body hemorrhagic, its center cystic. S. 3. Corpus luteum enlarged, naked and protruding with a small cyst in the protruding dome. The other ovary of the pair has a deep central cyst and shows enlarged blood vessels at the dark spots. S. 2. A small, corrugated yellow body, protruding and naked with hemorrhagic dome, the center of the body showing beginning cystic degeneration. S. 5. Protruding naked corpus luteum with soft, hemorrhagic dome. Above the latest yellow body is the remnant of an older corpus luteum, showing fibrous septa. The other ovary of the pair is markedly cystic. S. 6. A deep-seated corpus luteum as in pyometra. The other ovary of the pair has a small central cyst. S. 4. A protruding naked corpus luteum with a black hematoma near its center. The ovary also contains an older corpus luteum which shows a large cyst in its center, the lutein tissue having been reduced to a thin girdle about the cyst. The other ovary of the pair has a deep-seated cyst.

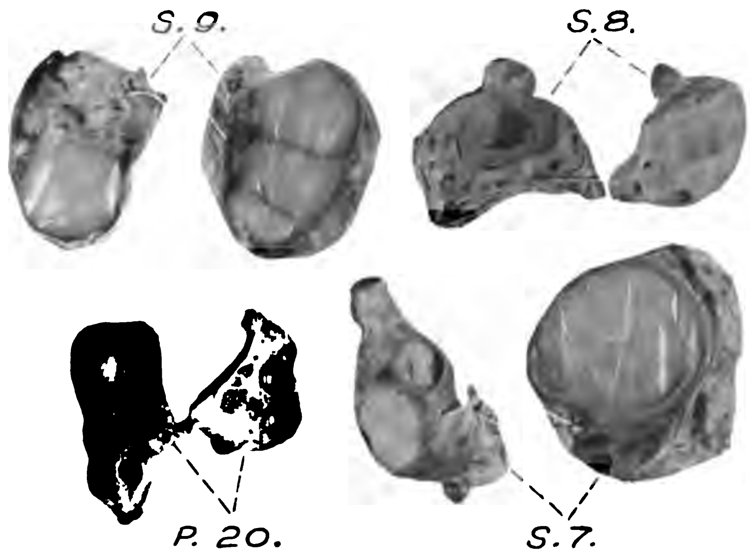


Fig. 4.

Figure 4. Ovaries of sterility, especially of nymphomania. P. 20. Check ovary from pregnant heifer. S. 7. Pair of cystic ovaries. In the larger one a thin girdle of lutein tissue is seen about the gelatinized lymph of the large cyst. S. 8. A protruding naked corpus luteum with large cyst in the center. S. 9. Pair of cystic ovaries, the larger ovary containing three separate cysts.

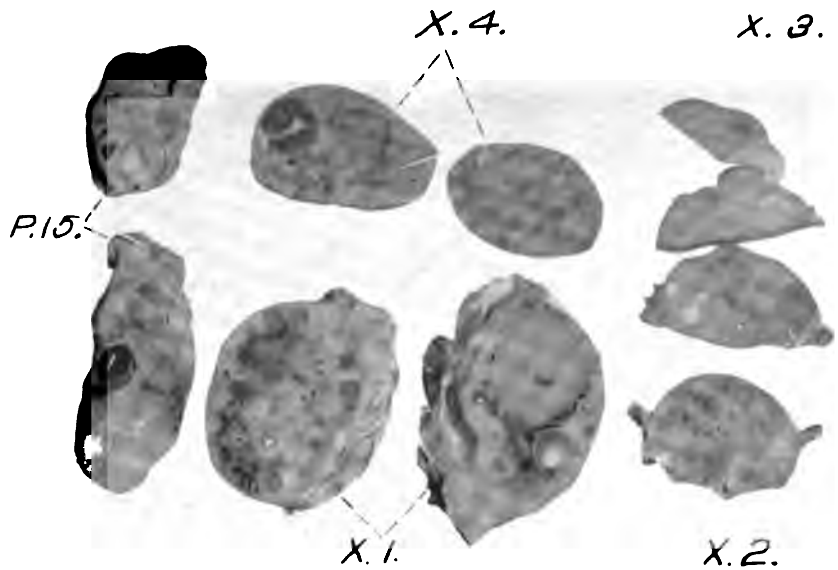


Fig. 5.

Figure 5. Ovaries of pyometra, P. 15. Check ovary of pregnancy. X. 1. On the right a deep-seated corpus luteum of sterility. Both ovaries are very dark and vascular. X. 2. A small, fibrous, stellate deep-seated old corpus luteum. X. 3. Two old partly atrophied corpora lutea on either side with a small protruding naked yellow body of recent date in the center. X. 4. On the right an old, indistinct central corpus luteum, on the left a deep-seated stellate old corpus luteum.

REMARKS ON OPHTHALMIA, WITH SPECIAL REFERENCE TO CERTAIN TRAUMATIC AND IDIOPATHIC DISTURBANCES.

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In the role of general veterinary practice are frequently encountered affections or injuries of the ocular structure, and unless possibly the teachings of recent years are to be accepted, we have to confess that attention to disorders of the eye or its adnexa has been altogether too perfunctory or mechanical. Once the ophthalmic structures have become diseased, we have accepted certain results, usually deleterious to the well-being of the animal as a foregone conclusion, and so permitted our lethargy to curtail progress in this phase of veterinary science.

In presenting this topic for your consideration, the writer makes no claim for new or miraculous discoveries in the way of diagnosis or specific therapeutics, but selects his subject imbued with the hope that it may stimulate investigation into this all-important, but thus far unappreciated field of professional research. In the selection of a title the word "Ophthalmia" has been chosen not because primary mild inflammatory processes are considered of lesser importance than severe inflammatory disturbance, but simply because it seems to best conserve the purpose of combining all varieties of inflammatory disturbance of the ocular structures irrespective of etiologic influence.

The formation of the eye and associated parts is so complex and delicate, also the varied character of disturbances so numerous, that to have a clear understanding of the pathology of eye affections a knowledge of the anatomy and physiology of these parts would appear to be imperative; it seems, therefore, not out of place to review somewhat the structure and esthesiophysiology of the organs under consideration, even though time forbids of intricate detail.

The organs of vision comprise both directly and indirectly relative structures. The eyeball proper has the form of a flattened

spheroid, with a somewhat greater vertical axis, so situated within the orbital fossa as to be more or less protected by the bony wall and imbedding fatty tissue; included within its makeup are three distinct coats: the sclera, vascular, and nervous tunics. The outermost, or sclerotic tunic, often termed the "white of the eye," envelops practically four-fifths of the visual globe; it is made up of dense, white fibrous tissue that is interspersed with a few fine elastic fibers. On the outer surface of the sclera are attached the tendons of muscles which support the eyeball and aid in changing its axis; the sclera is far more vascular anteriorly, where it blends with the sub-conjunctival tissue, and likewise the oval cornea or remaining one-fifth of this sclerotic or fibrous tunic.

The cornea, a transparent, non-vascular structure, circular in most eyes, but oval in the horse, allows light rays to penetrate the eyeball and is the chief refractive apparatus, being even more important in this respect than the crystalline lens, as its focal length expands to over twice the area of the latter; moreover, upon removal of the lens, an operation at times performed for relief of blindness due to cataract, the dioptric effects are not destroyed, while corneal injury on the contrary severely impairs these refractive powers. It is composed of five layers of tissue; central or substantia propria which constitutes the main portion is directly continuous with the fibrous connective tissue of the sclera. The blood supply to the normal cornea is limited to the circumferential area, but its whole substance is freely supplied with nerve tissue, and nutrition is derived through circulation of lymph.

Intimately related to the inside of the sclerotic tunic is the brown colored, non-sensitive, choroid coat, or vascular tunic, which serves to separate the white fibrous sclera from the delicate nerve tunic or retina. This middle coat extends postero-anteriorly from the entrance of the optic nerve to the pupillary margin, and is made up of three distinct portions; that is, beginning posteriorly, choroid proper, ciliary body, and iris. The first and second contact with the sclera and extend from the optic nerve to the anterior limit of the retina, while the iris bends inward, floating free within the cavity that develops anterior to the lens and which is unequally divided into an anterior and posterior chamber.

The iris, or third portion of the middle or vascular tunic, may

be described as an adjustable, muscular diaphragm, supplied with a series of blood vessels making it exceedingly vascular. It is punctured centrally by the pupillary opening, which varies somewhat in shape among different animals; though circular in the dog, it is normally elliptical in the horse, but becomes circular during dilatation through a lateral pull exerted by the ligament inhibitor attached to the sides and rear of the iris. The cow, sheep, and cat likewise have elliptical openings; in the latter, however, the elliptical slit is vertical.

Movement of the iris is regulated through a spincter and dilator muscles that are supplied both with sympathetic and motor nerves. While the iris is rather sluggish in most animals other than felines, it is well to have in mind that in the horse it relaxes under artificial light, thus rendering the use of the ophthalmoscope especially valuable for examining the interior of the equine eye, and obviating the necessity of atropine for its mydriatic effects; again, that exercise or sudden death produce a similar dilatation to the pupil. The color of the iris varies, depending upon the amount of pigment deposited within the cells of its inner portion. Through the pupillary opening penetrate the light rays, to be impressed upon the retina beyond; the iris reflexly narrows as light increases in intensity, thus cutting the rays at the periphery and obviating the tendency for marginal errors in focus during the time the center of the image is on the retina. At the time of contraction of the spincter pupillae to produce greater extension of vision when gaze is fixed upon a nearby object, there is also contraction of the ciliary muscles, thus improving ocular accommodation through shortening of the eyeball; this is brought about by pulling forward the choroid coat, which in turn lessens tension on the suspensory ligaments attached laterally to the lens, whereupon the latter through its natural elasticity bulges, thus increasing its refractive power. In the horse there is normally found on the upper center of the edge of the iris, sometimes on the lower edge, one or more bodies called corpora nigra of uncertain function, but giving the edge a ragged aspect.

The third or nervous tunic may be described as the inner circumferential, concave wall or perceptive membrane of the eyeball upon which light impressions are received. It is developed, together with the brain, during embryonic life and extends from the entrance of the optic nerve to the circumference of the pupil, but does not all functionate as a light receptor, for it becomes

atrophic over the ciliary body and iris of the vascular or middle tunic; the functioning portion of this delicate membrane being intimately applied to the choroid part of the middle tunic. The retina is made up of an outgrowth of the brain sac, composed of nerve elements distributed as an outer and inner surface; the outer surface, or pigment layer, where the visual purple is produced, later to be decomposed by light, represents the outer wall of the fetal optic vesicle, while the inner surface of the retina is divided into several layers and contains within its substance ganglionic cells that are continuous with the brain after consolidating into the optic nerve, the most important of these being the layer of rods and cones, where the visual impulses are effected as a result of light vibration and from whence these impulses are carried back to that portion of the retina adjacent to the vitreous humor, where, received by the nerve fibers, the impressions are conveyed to the brain. In the center of the retina and somewhat above the optic nerve is an unpigmented spot readily seen with the ophthalmoscope which is called the tapetum lucidum, giving to the eye the property of shining in the dark.

The optic nerve, after passing anteriorly from the under surface of the brain, enters the orbital fossa, projecting somewhat into the posterior circumference of the retina as the optic papilla. It is surrounded by three sheaths as prolongations of the brain, that is: dura mater, pia mater, and the central arachnoidal sheath, the inner or pial sheath becoming continuous as the sclera. The optic papilla devoid of retinal covering gives no response to light impressions and is termed "the blind spot." Fibers entering the optic disc from the retina pass from each eye to a region at the base of the brain, there coming together in the optic chiasma; after this junction the fibers again separate and while some decussate, others pass to that side of the brain which corresponds with the eye from which they have come. In the horse about one-sixth of the fibers go to the same side, while in man only two-fifths decussate.

Lying in close proximity and immediately behind the iris is the crystalline lens, a bi-convex transparent body composed of a series of concentric or onion-like laminae, which tend to centrally intensify the refractive character of this portion. The lens is enclosed within a closely adhering capsule of elastic character. This important refractive portion of the eye is without blood ves-

sels, except during fetal life and is held in place by a suspensory ligament that takes part in changing the shape of the lens when aided by the ciliary muscle.

The rest of the eyeball is largely hollow and in front of the lens has two unequal chambers; an anterior one bounded in front by the cornea and behind by the iris and crystalline lens; posterior chamber, the smaller of the two, lies behind the iris, but between it and the lens, being continuous with the larger chamber through the pupillary opening. These chambers contain a watery constituency termed aqueous humor, which has to do with maintaining the intra-ocular pressure and shape of the eyeball. After withdrawing the fluid from the anterior chamber the cavity refills within twenty-four hours. This liquid is a tissue lymph derived from blood plasma, but whether secreted or produced through purely mechanical filtration, opinions differ; certain it is that anything increasing blood pressure augments intra-ocular tension.

Behind the lens, which it helps to support, and anterior to the wall of the retina is a semi-fluid, transparent, refractive media termed vitreous body, or vitreous humor.

The structures indirectly associated as accessory to the visual anatomy are the eyelids, constituting an upper and lower movable palpebrae, having both voluntary and involuntary movement. Each lid has a free cartilagenous border covered externally with skin and internally with mucous membrane; the lids comprise five distinct tissues arranged from without in, as the skin, subcutaneous tissue, muscular layer, tarso-fascial tissue, and conjunctiva. Upon either lid at the inner angle of junction or inner canthus, may be noticed a small elevation or projecting puncti, the excretory openings to the canaliculus that leads from each lid to the upper portion of the nasal duct, or as it is termed the tear sac; this sac, lodged within the lachrymal bone, collects the surplus tears prior to their escape along the nasal duct, which opens subsequently inside of the nostril wing. Each lid is supplied with a double row of cilia or "eyelashes," those of the upper being longer and more numerous.

Second accessory—lachrymal gland, is located superiorly to the eyeball beneath the orbital arch and composed of glandular tissue with ducts that unite to form the hygrophthalmic canal, out of which pours the watery alkaline secretion anteriorly over the surface of the eye.

As a third accessory to the eye proper should be considered

the all important mucous membraneous covering that becomes continuous with the sclera upon its outer anterior circumference of the eyeball and is then everted over the inner surface of the lids. This mucous membraneous lining, respectively termed "the bulbar" and "palpebral" conjunctiva, has also a third portion or semi-lunar fold, variously called "third eyelid" or "membrana nictitans," which is only partially seen, except during strong retraction of the eyeball, when it is observed to protrude from beneath the inner canthus of the lids. Constant secretion from this mucous membrane, aided by that from the lachrymal glands, together with an involuntary motion of the lids, serve to keep the surface of the eyeball free from irritating substances and to moisten the sensitive corneal surface.

The entire eyeball is richly vascular, including the conjunctival vessels derived from the palpebral and lachrymal arteries; the ciliary arteries supplying the sclera, choroid plexus and iris, and also the vessels of the retina derived from an artery that enters the eyeball in the center of the optic nerve.

In using the eyes, the animal keeps the eyeball in more or less constant motion, to facilitate bringing each object toward the center of the field of vision, and though the entire external world may be considered as the visual field, it is limited both by configuration of the head and refraction defects. In consideration of the former the vision is either monocular, binocular, or a combination of both, and while monocular vision gives a wide visal range, binocular sight furnishes greater clearness. Eyes laterally placed, as in the case with the horse, have monocular vision, while the cat or man are examples of binocular sight.

The equine furnishes a complex example of combined monocular and binocular movements, for while looking at an object directly ahead, although binocular vision is possible, the ocular movements are opposite, thus bringing the pupillary portion of both eyes simultaneously toward the center, a double internal squint, and in no other position is this vision possible; here movement of an eye toward the nasal region of the head is associated with the same direction taken by the other eye, while in man, movement of an eye toward the nose is associated with the other eye going toward the temporal side. During monocular vision on the contrary the movements are lateral or posterior. As most animals enjoy monocular vision, there is less impairment than in man as a result of the loss of sight in one eye, and al-

though there is a degree of impairment as regards area, depth, or solidity of objects, there continues a fair degree of accuracy.

The constant motion of the ocular ball is accomplished through the aid of seven extrinsic muscles, in turn innervated by the third, fourth and sixth pairs of cranial nerves. The fourth and sixth supply the superior, oblique and external rectus respectively, while the third pair furnishes movement for the remaining four; that is, internal, superior and inferior recti, and the inferior oblique.

During the discourse on the structure of the eye it was intimated that the visual parts were more particularly in the nature of impression surfaces and refraction media. The former comprise two lenses and two corneal surfaces, each with different curvatures, while the refraction media include the lens substance, with varying refraction throughout, the aqueous and the vitreous humors. These surfaces and media collectively aim toward placing an image of an external object or ray of light directly upon the sensitive retinal surface, but investigation will disclose the fact that these images are inverted, as is the case with a photographic camera, and though actually inverted upon the retina, objects are appreciated in the same erect manner as they actually exist, because all visual sensations take place in the brain and by habit sight-seeing animals have learned to project the retinal sensations outward into the external world.

There are certain congenital or acquired defects in refraction, but more especially common in animals is the condition of myopia (short-sightedness), where as a result of excessive lens or corneal curvature, or again because of too much depth to the eyeball, the rays of light focus in front of the retina, thus causing blurring of the image. This is often a cause of shying.

A number of instruments have been devised that permit objective study of ocular refraction, and while from the use of charts and a series of spherical and cylindrical lenses it may be studied subjectively in its application to the human being, such methods do not pertain here. With us the ophthalmoscope furnishes valuable aid in the examination of the eye assisting in the recognization of diseased conditions of the retina, as well as helping to detect abnormalities of the refracting surfaces.

ALTERATIONS IN EXPRESSION.

Prior to discussing any special disease involving either the eye proper or its adnexa, we are tempted to stop for a moment to consider the subject of expression and alterations of one or more of the ocular structures resulting from certain influences operating both during health and under abnormal conditions. The dearth of literature in this regard would indicate that little more than passing thought has been given to the whyfore or values to be deducted from the enormous range of variation in expression, which becomes manifest with apparently the very slightest alteration or movement of the lids or ocular structure. To emphasize the significance of this to the normal animal it is only necessary to recall methods employed by the expert horseman and observe what degree of reliance is placed upon a skillful interpretation of expression when making a selection of a special type of animal. Determined primarily what type or conformation is desired, selection is made only after due consideration is given to the appearance and position of the eyes; experience has taught this trained individual that he can find there interpretations of quality and character. Besides selecting an animal with a clear, sparkling cornea and uniformity of the two eyes, is also noted the degree of mobility of the lids, of restlessness of the eye itself, of natural vigor and trustworthiness, as is indicated through changeableness and frankness of expression.

As there is therefore much to be gained through intelligent interpretation of appearance of the normal eye, so also will an observer find this organ a valuable indicator of either local or general systematic disturbance, and this frequently through changed expression alone. As the eye becomes an indicator of vigor or feebleness, it likewise interprets severe pain by peculiar, but not readily explained, contracted movements of the palpebral muscles of the upper lid more especially. Again, we read anxiety, worry or fear, even evidence of collapse, as is seen in the so-called "glassy" eye of the unfortunate victim of internal rupture, perhaps occasioned during the agonies of enteralgia or the dissolution of the last stages of pleurisy; once more, depressing fevers show dullness, lassitude and lack of expression, even partial rotation or retraction of the eyeball so commonly seen in the physiognomy of the sick feline. Repeated disease involving the eye tends to diminish size, and in recurrent ophthalmia do we

note that characteristic triangular appearance of the upper lid, observed even between the intervals of attack. Other diseases are likewise not infrequently associated with ocular changes: tetanus, characterized by retraction of the eyeball and extension of the membrana nictitans over the cornea, as well as a nervous twitching in these parts; edema of lids, or chemotic infiltration accompanying the so-called "pink-eye" variety of influenza, epizootic cellulitis and purpura hemorrhagica. Finally in human medicine is great stress placed upon the tendency for ocular complications during certain specific fevers, as foot-and-mouth disease, influenza, pneumonia and measles, where conjunctivitis is especially liable to intervene; likewise complications involving the eye or appendages attending typhoid fever and tuberculosis, as well as those coincident with disturbances of the urinary apparatus, where, for example, the blood poisoning of Bright's disease attacks the nervous system with special intensity oftentimes resulting in impaired vision.

So might one continue, even supplying detail, to demonstrate the very intricate relationship between mental impressions or disease and ocular alterations or expressions. Sufficient has been said, however, to strengthen a claim of sympathetic unity between this organ to a morbid state of the system and the possibilities for a great range in the variety of such alterations may be readily appreciated when one realizes that no less than six of the twelve pairs of cranial nerves send branches to the eye or its appendages and that of these the second, third, fourth and sixth pairs are distributed exclusively to these parts; moreover, this innervation is further reinforced by branches from at least two cranial sympathetic nerves.

It can be safely asserted that the nervous system is fundamentally instrumental in stimulating these interesting alterations, especially those changes in expression observed during health and which are particularly influenced through mental impressions and temperament, but this does not seem to intelligently account for changes accompanying the morbid conditions, a few of which have been cited. Intelligent answer to interrogation as to why these changes do actually supervene; why debilitating fevers produce dull eye and appearance of listlessness; again, why pain is associated with what we have come to interpret as anxiety, and finally why collapse is accompanied with that glassy look, would furnish useful knowledge that must necessarily be accumulated

slowly. This certainly opens an attractive field for research and study that should serve as a valuable reinforcement to objective methods in diagnosis, recognized as fundamentally important in the interpretation of symptomatology in veterinary medicine.

Without having had opportunity to pursue methodical investigation with a view toward elucidating the true etiologic factors pertaining in these instances (an investigation we are hoping to begin shortly), it may be reasonably suggested that the direct result of even slight impairment to the bodily functions tend toward alteration in the condition of the blood as regards its purifying abilities; toward change in the vessel walls through increasing or lowering arterial pressure or producing a tendency toward permability; likewise, effecting the nutritive carrying powers of the circulation. These disturbances in turn must naturally affect the innervation, but in a manner to be governed entirely by the degree of influence exerted through the morbid factor. To illustrate: Note the predisposition toward cataract when nutrition is interfered with; the tendency for conjunctivitis to accompany influenza or pneumonia, where in the latter instance the pneumococcus organism may be isolated from the mucous membraneous discharge; likewise observe the liability for changes in the appearance of the sclera during jaundice, or, again, feebleness of accommodation accompanying general weakness.

CONGENITAL ANOMALIES.

Arrested development or aberration in growth of embryonic tissue furnishes some interesting instances of impaired vision; these mutilations or imperfections may involve any one, two or all portions of either the direct or indirect ocular structures and, although too numerous to permit of exhaustive consideration, some, at least, are sufficiently common to make them worthy of mention.

Coloboma.

In the normal evolution of the eye during primary development of the optic cup and its stalk, which is occasioned as a result of invagination of the optic vesicle, there is formed the choroid fissure thus allowing an ingrowth of the embryonic mesablastic layer to convey blood vessels into the interior and, likewise, to aid in the future formation of the vitreous humor. Should this

invagination or groove fail to close completely as it subsequently should to thus become obliterated, the result would be a defective eye and, depending upon the depth of the cleft, become influential in the formation of either a choroidal or iridal fissure, or, as frequently happens, of a compound fissure involving both structures, respectively termed "coloboma choroideae" or "coloboma iridis." Either defect is sufficient to cause an irrelievable impairment to vision and one believed to be easily transmitted by inheritance. Similar fissures are discovered at times upon other ocular structures and they are quite generally associated with cataract.

Likewise during embryonic growth may a coloboma or fissure of the eyelid result through arrested development. In appearance these fissures simulate the hair lip and are classified as "coloboma palpebrae congenitum." The opening is somewhat triangular with apex toward orbital margin and renders complete closure impossible. It is possible to relieve this anomaly under the general rules of surgery by freshening the edges of the fissure and suturing to unite the raw cutaneous margins.

Opacities.

The lens, an epithelial structure derived from the external germinal layer, consists primarily of a hollow sac that subsequently becomes filled with cells to constitute a solid sphere; during this embryonic period blood vessels distributed throughout the eye are derived mostly from the central artery of the optic nerve which, extending anteriorly, reaches the posterior surface of the crystalline lens and from thence ramifies over this area. As the lens is similarly covered anteriorly by vascular network, it is entirely enclosed within a vascular membrane, tunica vasculosa lentis, which subsequently becomes the transparent lens capsule. Occasionally this tunica, which should become unobservable prior to birth, persists in the region of the pupil producing a state of "atresia pupillae congenita" or closure of the pupil.

Blindness as a result of opacity of the crystalline lens, or what is commonly termed cataract, occurs during intra-uterine life as a result of inflammation in the fetal eye or consequent upon disturbed development.

Again, in the early development of the vitreous humor, which has origin from cells of the inner layer of the ocular vesicle, or, in other words, that portion which ultimately becomes the retina,

and while it is gradually pushing the lens toward the anterior wall, there passes through this region the arteria centralis of the optic nerve on its way to the tunica vasculosa lentis as stated in foregoing paragraph. This artery should later become a transparent lymph structure, the "canalis hyaloideus," but if, defective may remain persistent from retina to posterior lens surface and so cause impaired vision through producing opacities on the posterior portion of the lens.

Among other opacities may be mentioned those of corneal origin that are not especially frequent but occasionally develop from fetal keratitis or in connection with other congenital anomalies of the eye.

Speckled Retina.

Inheritance appears to play an influential role as does, also, consanguinity of parent in producing defective sight. Among conditions directly attributed to these factors is a state where the retinal pigmentation is spotted rather than diffuse and the result of pigmentation degeneration being more rapid than the physiologic pigmentation process. This defect narrows the visual field and diminishes central acuteness of sight, and, like other anomalies of the primary structures, cannot be overcome.

Albinism.

An absence of physiologic pigment of congenital origin and very readily transmitted through inheritance. It is characterized as an eye with a light gray iris that appears reddish on transmitted light; pupil shows red and with the aid of an ophthalmoscope the retinal blood vessels are seen clearly outlined upon a white background. Examination of the retinal surface of the albino eye has demonstrated that though the pigment cells are present there is an absence of the normal coloring matter. Eyes of this character are essentially photophobic, the eyeball tends to roll with considerable constancy, vision is less acute and there is a tendency to nearsightedness.

Palpebral Fusion.

The eyelids are formed from ectodermal ridges that originate both above and below the ocular opening; these ridges subsequently develop into folds composed externally of skin and internally of mucous membrane. During early embryonic growth

of all animals the lids are separated but ultimately grow toward one another to become fused at a more mature period of fetal life. This fusion, shortly before birth in most animals, becomes again dissolved, thus permitting re-opening of the eyelids. Exception to this in normal instances can be observed in the blind mole, and, moreover, the time of opening varies in different species, some being anti-partum while others are post-partum. Persistent fusion as an anomaly occurs resulting in a state of blepharal closure and blindness through inability of light rays to penetrate between the adhering lids, constituting a state of "blepharosinechia."

Dermoid Tumors.

These growths occur upon the primary ocular structures as the choroid plexus, internal parts of eye or cornea and due to aberration of growth. It is, moreover, quite evident that they arise with greater frequency as a result of arrested development when discovered upon the conjunctiva or nictitans membrane. While dermoids of aberration are difficult or, indeed, impossible to overcome without destruction to even the imperfect sight that may exist, those discovered upon the conjunctiva are quite available for treatment.

This benign growth is of solid consistency, immovable, usually situated partly upon the cornea and partly involving the conjunctiva, covered in animals, as a rule, with hairs that not infrequently are a source of ocular irritation; they are histologically the composition of skin, are invariably congenital and in the writer's experience, at least, seen more frequently in the bovine. Dermoids interfere with vision in a degree depending upon the extent of pupillary encroachment but can be ablated by careful dissection from the cornea, sclera or adjacent conjunctiva. A permanent cloud usually remains upon the cornea and the growth will be renewed if not entirely removed. These growths are believed to have origin through lack of normal amount of amniotic fluid, a condition tending to press the amnion against the lids, which in turn are crowded upon the eyeball, thus fostering attachment of a rudimentary portion of skin upon the cornea or sclera.

Lachrymal Duct Occlusion.

Occlusion or abnormal development in the lachrymal apparatus

should likewise be briefly considered. As the parts included here are developed through a thickening of the ectoderm into a solid chain or cord of cells, and later through a degeneration of the central portion into the lachrymal duct and sac, it can easily be appreciated that absence of canal is possible as indeed it is recorded among congenital anomaly of the lachrymal apparatus.

DISTURBANCES OF CONJUNCTIVA.

The delicate character as well as continuous exposure of the mucous membrane lining the lids and anterior surface of the eyeball renders it especially susceptible to injury or disturbances of inflammatory nature; the former, indeed, oftentimes constitutes a primary etiologic factor toward conjunctivitis. It would be but idle time to attempt any systematic enumeration of those factors capable of producing traumata or to even suggest the ultimate effect an offending object might have upon either the primary or secondary ocular structures. In a general way, however, may be sighted such foreign bodies as hay chaff, dust, insects, etc., that become lodged in the conjunctival sac; wounds, contusions or lacerations from blows, nails, glass and various implements of stable and farm; again, irritating substances, chemicals, flames or bites of other animals, etc., etc. Likewise, inflammation of the conjunctiva is by no means entirely dependent upon injury; it occurs as a result of defective hygiene, through extension from blepharal disturbances, from eczema; moreover, bacterial influence plays an important role both in human and veterinary ophthalmic diseases being instrumental in causing inflammation varying both in type and severity.

Distinguished principally through a knowledge of its etiology, conjunctivitis is variously classified as conjunctivitis neonatorum (of the new-born); conjunctivitis vernalis (springtime); purulent conjunctivitis; phlyctenular conjunctivitis, etc. Besides these we must recognize those attacks peculiarly related to periodic ophthalmia, influenza, epizootic cellulitis and canine distemper; again, the non-specific, acute or chronic catarrhal conjunctivitis that has as an etiologic base excessive irritation but free from bacterial or toxic influence. Eliminating, then, all varieties consequent upon any specific infection or determinable factor, we will consider symptomatology and theraphy of what, for the sake of brevity and definiteness, may be termed catarrhal and purulent

conjunctivitis. In the symptomatology of conjunctivitis, it is interesting and pertinent to determine that portion of the mucous membrane especially involved. As the circulation to this tissue is derived from two sources, the posterior conjunctival vessels and anterior ciliary vessels, it is readily possible to anticipate a varying aspect to the inflammatory injection; moreover, the degree of injection enables the diagnostician to estimate the intensity of the inflammatory attack. When the posterior conjunctival vessels are more intensely implicated, there is to be observed a vivid scarlet or brick-red hue, this more generally associated with a local conjunctivitis; on the other hand, congestion of anterior ciliary vessels is associated with a rose-red hue about the circumference of the cornea, this is quite constant with corneal trouble or general ophthalmia.

Symptoms of acute conjunctivitis will vary whether of primary or secondary origin, with the degree of bodily resistance as well as depend upon the nature of etiologic influence. Mild attacks with either one or both eyes affected note frequently a primary involvement of the lids in the form of a blepharitis which present a redness, fullness, tendency to relaxation and edema, even chemosis if the palpebral membrane is implicated to any extent, which under such circumstances usually appears injected and smooth. At times petechial or ecchymotic discolorations are observed as a result of rupture of overdistended vessels; lachrymation, photophobia, itching and a feeling of warmth to the touch; mucus tends to accumulate about the canthi later becoming of a creamy purulent nature in those cases characterized as purulent conjunctivitis; this accumulation is inclined to produce adhesion between the upper and lower lid. Pain is not at all noteworthy, being more especially associated with ciliary congestion or the result of effect of foreign substances. The exhibitions of purulent conjunctivitis are practically the same, but of greater intensity and especially liable to be a secondary disturbance to distemper, pink eye or some other microörganic influence that has gained a foothold directly or as a result of lessened resistance.

The termination of uncomplicated cases is usually resolution after from five to ten days' duration. A severe attack or a purulent conjunctivitis, however, may readily become complicated, passing into chronic conjunctivitis, keratitis, corneal ulceration or perforation iritis, or at times assuming a condition of ophthalmic catarrh, more especially when allowed to become

protracted or if treatment is abusive through application of urine, tobacco juice or other empiric preparations not infrequently administered. Besides complications involving the ocular apparatus do we note excoriations and injurious reactions upon the surrounding skin.

In the therapy of conjunctivitis cold compresses applied early often serve to abort the trouble; later, hot fomentations of medicated water, using, for example, boracic acid, one ounce to quart, are indicated. For both acute or chronic forms of conjunctivitis the silver preparations are receiving special consideration and though nitrate of silver in solutions of from two to five per cent strength, or protargol from five to fifteen per cent are highly recommended, the writer has long used and prefers argyrol, in strengths varying from five to twenty-five per cent, depending upon frequency of application, severity and duration of attack. Not only is this an efficient sedative, but it affords quick relief of the inflammatory condition. Astringent collyria containing alum or zinc sulphate are excellent applications between intervals indicated for employment of argyrol. Besides local treatment the patient should be kept out of intense light and darkened quarters are especially beneficial; moreover, food and exercise are to be limited to aid in lessening the inflammatory condition.

DISTURBANCES OF CORNEA.

When discoursing upon anatomy and physiology of ocular structures it was intimated that the transparent cornea is an especially important refractive media. As inflammation or traumata of the cornea invariably impairs this refractive power through diminution of transparency and a tendency toward an opacity of either transient or stationary character, and, moreover, as prognosis of any morbid state of this tissue will depend largely upon the duration of this cloudiness, much importance must be placed upon early diagnosis and efficient therapeutic measures.

Eliminating all attempts to specify any etiologic influence operative in the development of corneal opacities, we will confine ourselves to its actual existence as a result of keratitis under the classification by Fuchs in his "Text Book of Ophthalmogy," where the author divides all corneal inflammations into non-suppurative and suppurative keratitis, including among the former

pannus, parenchymatous keratitis, or disturbances where the stroma of the cornea remains more or less intact and characterized by tendency for resorption of the inflammatory exudate. Sundry varieties of ulceration comprise the suppurative group and all are associated with localized destruction of corneal tissue.

Inflammation of the cornea may primarily show itself in any one or more of the series of layers of this tissue; the outer suffers more especially during conjunctivitis from trauma while idiopathic diseases involve the inner layers usually with other structures. Keratitis begins as an infiltration that constitutes an exudate which immediately produces diminished transparency; the luster of the corneal surface becomes lessened and the tissue over the area involved assumes a gray appearance. Should the process develop beyond this primary stage, blood vessels begin to grow out into the cornea from the margin; in pannus which constitutes the formation of new tissue, or a film-like growth involving the outer epithelial layer, these vessels are observed of a vivid red hue, coming from the conjunctival vessels; in parenchymatous keratitis, on the contrary, the new-formed vessels are more indefinite and seem to arise from the deeper-seated sclera. By this time sight is severely impaired and the process has reached its height to begin repair from the margins, the center of the cornea being the last to clear up. Many cases become entirely recovered through resorption of the exudate, but when the attack is at all protracted there is a tendency for the exudate to form new connective tissue and thus remain as a permanent impairment to both appearance and vision. In the suppurative keratitis the processes and symptoms are identical through the infiltration stage, but as result of inability of the stroma to maintain life in the exudate area there occurs destruction of that part of the cornea as an inclosed abscess or more commonly as a superficial ulceration through exfoliation of the epithelial layer with loss of substance and depression which produces irregularity to the corneal surface. The surrounding tissue is cloudy, floor of ulcer gray colored, marginal walls injected and these manifestations are associated with disturbed vision, lachrymation, photophobia, irritation and occasionally pain, the latter symptoms not invariably though sometimes observed in the non-suppurative form.

The process may here become checked or progressing involve neighboring structures with complications of conjunctivitis,

edema of lids, iritis, etc., again be instrumental in producing perforation with obliteration of the anterior chamber, or production of turbidity of its aqueous humor technically known as "hypopyon." The more favorable termination otherwise being new-formed, opaqua, cicatrized tissue.

Hypopyon is often free from pus organism owing to the leucocytes having emigrated from the deeper structure of the eye. This exudate falls to the bottom of the chamber and if uninfected is not of serious consequence; as a rule absorption of hypopyon is rapid without leaving any evidences of having occurred but occasionally through delay it assumes an organized consistency to remain in permanent evidence within the anterior chamber.

Therapy.

All cases of keratitis showing the least tendency toward lachrymation and photophobia should be housed in darkened quarters and are often primarily benefited by warm medicated compresses. When considerable sensitiveness is manifest by symptoms of pain and photophobia, dionin appears to be especially beneficial through its sedative and analgesic properties. Atropin has long been lauded in keratitis for its mydriatic influence toward preventing adhesion of cornea and iris; cocain, though likewise having the same power to dilate the pupil, is contra-indicated because it is liable to increase tendency of ulceration as its action is associated with diminished corneal nutrition.

Cloudiness of cornea is often cleared through dusting calomel into the conjunctival sac; it is, however, contra-indicated with internal administration of preparations of iodin. Should the cornea seem densely clouded as result of disturbances simulating or characterized as pannus and parenchymatous keratitis when at times calomel appears ineffectual, caustics are indicated, preferably silver nitrate in solutions varying in strength from two to five per cent. Ulcers coincident with debilitating disease thus treated are substantially benefited through the conjoined aid of internal administration of cod liver oil, arsenic, iron, etc., infectious ulcers may be touched with pure phenol while indolent ones often yield to absolute alcohol.

Paracentesis of the cornea is often advised in instances of indolent or deep ulcers accomplishing the two-fold purpose of controlling the bulging of the iris that usually becomes coincident to spontaneous rupture and, likewise, it serves to diminish the

extent of the future cicatricial tissue as the operation invariably appears to check any further ulcerous tendency. Again, paracentesis is necessary in severe instances of hypopyon in order to evacuate the anterior chamber; here, however, the operation should not be tried until absorption of the exudate has been attempted and adrenalin seems to do excellent work in this instance, while it also aids in reducing congestion in surrounding structures. The resulting scar may be removed or materially lessened by use of yellow oxide of mercury and dionin, the latter possessing valuable lymphagogic qualities.

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Doane, "Text-Book of Ophthalmology."

DISCUSSION.

Dr. Baker: I have been, perhaps, more than ordinarily interested in what Dr. Lyman has had to say in his paper, and more particularly in regard to what he says concerning treatment, primarily, of course, on account of being in active practice, and secondarily, because it has been my lot to teach this subject. I think the preliminary portion of his paper is scarcely open to criticism. It cannot be, of course, because he has dealt in that portion with some of the general well known principles, but when it comes to the question of treatment, that is a different matter. As we all know, the extent of the difference of opinion as to remedy or therapeutics is unlimited. I presume in this connection, as in a good many other cases of theory and practice, most of us can get up and suggest a certain plausible theory, and support it by practical results; the difference of opinion in theory and practice is practically unlimited.

In regard to the treatment of the disease of the eye, I would like to speak first and particularly on the operation of paracentesis. I did not catch from Dr. Lyman's paper that he recommends it specifically for any disease, but simply alluded to it as a general principle. I would like to speak in reference to its use more especially in periodic ophthalmia of the horse, when, if it is done reasonably early, say on or about the third day of an acute attack, when the whole globe is in a state of inflammation, with great increase of the aqueous humor, and greatly increased intraocular pressure, it appears to afford immediate relief in a way that cannot be obtained from any other method of treatment; furthermore, it is considered to be nearly specific along the line of the removal of the trouble as theoretically considered today, and the theory I have is more strongly being maintained, that one of the principal causative factors in periodic ophthalmia is to be found in the aqueous humor. By the removal of the latter we practically eliminate the cause of the trouble, and at the same time get a very rapid and spontaneous beneficial response. If any of you have not tried this treatment I can recommend it highly and if the

operation is aseptically performed, you will find that it will cure the trouble three times out of five. In many cases, I should say in as high a proportion as three times out of five, there will be beneficial results without a recurrence, especially if you use potassium iodid, possibly with other remedies.

Dr. R. P. Lyman: Mr. Chairman, I have nothing particular to say in reply to Dr. Baker. I did not mention periodic ophthalmia for the simple reason that time would not permit me to go into any other diseases, but personally, I feel that the name "Periodic Ophthalmia" is a misnomer,—it does not indicate what the disease really is. We know that it ultimately results in cataract and, in my opinion, it is a disease which involves the cornea, aqueous humor and especially the iris, together with some of the secondary structures and in a severe attack, accompanied by inflammation of the iris that adds a tendency toward complications involving the rest of the eye-ball. I did not go into that in my paper because it would take a considerable amount of space, necessitating a long discussion. I, however, do think with Dr. Baker that the operation of paracentesis is valuable in a case of periodic ophthalmia, provided it can be done early and intelligently performed. As regards the treatments mentioned in the paper, I named a few drugs which can be used, which I have used and which were suggested not because they were specifics, but because they help to show the general therapeutic indications which are beneficial.

The operation of paracentesis, so far as it is associated with the cornea, is at times very valuable, because it lessens the pressure on the eye, helps to stop pain and inflammatory process, and sometimes aids in preventing adhesion of the cornea and iris. In a simple inflammation of the cornea, however, I think we should go slow in urging this operation of paracentesis, even though there is some tendency for hypopyon. I am willing to admit, of course, that if the indicated medical treatment does not show any lessening of the trouble, it may be well to perform the operation; again, if an ulcer upon the cornea is very obstinate and will not yield or stop under ordinary treatment, it may be necessary to resort to it, for as stated in the paper with especial emphasis, there is no treatment in either veterinary or human medicine which will more quickly stop ulcerous tendencies than the operation of paracentesis.

THE LABORATORY AND ITS RELATIONSHIP TO MEDICAL SCIENCE.

By R. A. Archibald,

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Occupying the, perhaps, unique position of a practitioner, a sanitarian, a teacher and a laboratory worker, it is assumed that we possess certain qualifications entitling us to briefly review some of the factors embodied or clothed in the above title.

We are prompted to a consideration of this subject for the reason that we firmly believe the laboratory, because of lack of proper recognition and appreciation, is not occupying the exalted position in the scientific world which rightfully belongs to it nor is it receiving due credit for the work it performs.

To facilitate the discussion or to more easily comprehend some of the phases of this subject as it pertains to the relationship of the laboratory and the laboratory worker to the science of medicine and sanitation, it is considered best to briefly discuss some of the problems incidental thereto under two headings, viz: First, the success and accomplishment of the laboratory; second, the failure of the laboratory in performing its mission.

THE SUCCESS OF THE LABORATORY.

In analyzing the success of the laboratory it should be borne in mind that notwithstanding the many achievements along sanitary and medical lines, the result of laboratory technique, we are still simply on the threshold of greater and more far reaching developments which will undoubtedly prove to be of incalculable benefit to human and animal welfare. We should also remember that it is upon laboratory research and investigation that practically all scientific problems of a medical nature have been and are dependent upon for solution.

The scope of the laboratory is a wide one and there yet remain many fields to be explored. In fact, the future of laboratory science is rich in allurement of interest, in promise of result and in possible benefit to mankind. Investigations along the lines of

immunity and the many biologic preparations for bringing it about, increases the importance of the laboratory, especially as regards the development of diagnostic and therapeutic medicine, and at the same time opens up a broad field for the study of physiology and pathology in connection therewith. Many problems have been studied in the laboratory for their scientific interest alone, but their solution has oft times shed light upon biologic principles of the broadest application. Laboratory work has done much to change the science of medicine from its experimental environment and place it upon a practical basis by supplying accurate knowledge where formerly only conjecture prevailed.

While the laboratory may perhaps be considered the offspring of medicine, yet it has undoubtedly established itself as the dictator of the medicine and the surgery of the future.

Since the abandonment of the doctrine of spontaneous generation and the embracing of the germ theory of disease, the progress and development of laboratory science has been marvelous and spectacular.

The new conception of the microscopic underworld, which laboratory technique has brought to light, must be recognized as a conspicuous land-mark, and by reason of its responsibility toward changing the attitude of man toward the universe it should be regarded as one of the most important triumphs of natural science. In fact, the penetration of this realm of obscurity gave the human race for the first time in its history a rational theory of disease, threw light upon the great cycle of living and nonliving matter and as a result of all this, a system of order was brought about in a region where unscientific imagination rioted in mystery and extravagance.

Many of these results obtained were gained only through long, patient and laborious research after many obstacles were met and overcome by accurate observation and experiment.

The revelations accomplished by etiologic research and investigation and the study of the biologic properties of pathogenic bacteria, enemies unseen and mysterious have been unmasked, and rational campaigns of public sanitation and personal hygiene have been made possible as the result of laboratory activities.

Upon similar revelations and elucidations the development of modern surgery has been brought about and as a result asepsis

and antisepsis have been developed to such an extent that surgery has forever shaken off its antiquated conditions and environments.

The permanent position which the laboratory holds towards medicine is, moreover, daily increasing in importance. Original discoveries are constantly adding to our knowledge of germ diseases and the outlook is favorable for eventually obtaining through serums, through attenuated cultures, or through toxic substances produced by micro-organisms themselves, the means of immunizing against if not curing many if not all of the specific infections.

Taking such propositions as the immunization of human beings against typhoid, smallpox, and other immunologic problems, the control and eradication of malaria, cholera, plague, and yellow fever, and the knowledge gained in regard to tuberculosis, glanders, rabies and other diseases bearing upon human and animal life, the discovery and invention of the complement fixation, precipitation and agglutination diagnostic tests, the light shed upon the subject of anaphylaxis or allergy and the role played by anaphylactic or allergic substances in the production of pathologic changes, and the great economic discoveries exemplified in the solution of such problems as the prevention, control and eradication of anthrax, hog cholera, Texas fever and many other diseases that not only may be transmissible from animal to man but also spell enormous financial loss to the agriculturist.

Time and space will not permit us to detail the number of scientific discoveries that have emanated from the brains of the laboratory worker, just a few diseases are mentioned for the purpose of furnishing criteria or demonstrating that these discoveries and many others are simply a forerunner and of comparatively little significance of what we may expect in the future.

As the result of laboratory research and investigation, almost all our methods of treating disease have been modified, and have progressed to such an extent that not only therapeutic methods based upon chemic medication, but also many surgical procedures are gradually and surely giving place to the use of the more logical and more efficient biologic preparations. This revolution has been fostered and nurtured and will undergo further development as the result of laboratory research, conducted and developed by the painstaking application of scientific energy, on the part of the modest, unassuming, conscientious laboratory

worker, whose only hope of reward is not dependent upon the small financial pittance, as remuneration, but upon that which is infinitely better from his viewpoint, the self consciousness that he has contributed his mite of knowledge towards the future benefit and welfare of mankind.

No part of laboratory technique should be taken greater advantage of than the making of diagnosis and yet this feature is unfortunately ignored. The early diagnosis of a disease often prevents needless suffering, saves human lives and prevents its dissemination. This is demonstrated in such infectious diseases a diphtheria, typhoid, rabies, tuberculosis, etc., but these facts are not yet appreciated as they should be, even in this modern age, and we frequently see such simple conditions as appendicitis so neglected for the lack of a little laboratory attention that death is the result. On the other hand, there are some progressive minds who show appreciation of laboratory technique which fact is amply demonstrated in similar conditions by the spectacle of an ambulance, nurses, and even the great and busy practitioner awaiting the result of some laboratory test before proceeding with medical or surgical interference.

Few persons outside of those engaged in laboratory work have any conception of the multiplicity of problems that daily arise and have to be dealt with as routine matters, a condition that is, of course, due to the new and varied problems that are constantly confronting us. Supplementing the field work of the sanitary expert in studying the probable source and character of new diseases, a complete hygienic laboratory is an important essential. The compilation of statistics and their publication for educational and legislative purposes, is by no means the least of a laboratory's intentions. Laboratory experts are frequently called upon to supply laboratory exhibits and to demonstrate them for the purpose of educating the lay and possibly the professional public along medical lines. The publishing of the results of work and other matters of interest for the purpose of instructing our people of the dangers of infectious diseases and upon methods of avoiding them should be and are matters of routine in an up to date laboratory.

The preparation of biologic products for curative and diagnostic purposes is one of the main functions of a laboratory and as regards the importance of this type of work, ample testimony can be furnished by any field man or practitioner who has ever

attempted to perform his duty under circumstances where he was not properly equipped with supplies of reliable biologics whose efficiency and practicability have been thoroughly demonstrated and proven by laboratory experimentation.

Brief mention may perhaps be made of the importance of the laboratory in the shedding of beneficial light upon other fields of human activity aside from its effect upon purely medical science. It has demonstrated the relationship of bacteria to decomposition, their effect upon the soil and plant life and has exemplified their intense importance in agricultural pursuits and many other industries, such as the production of wine, beer and dairy products.

THE FAILURE OF THE LABORATORY.

That the laboratory has in this supposedly enlightened age proved to be in a measure a failure is an undeniable truth but the cause of its failure can be summed up in the terms, lack of appreciation and recognition.

There is perhaps no condition in which apathetic indifference and lack of confidence are so markedly manifested as in the manner of sending and the submission of specimens for laboratory determination on the part of many sanitarians and practitioners. Many individuals seem to think that, in submitting specimens to the laboratory without the courteous accompaniment of a description of the source of such specimens, and the clinical symptoms incident thereto, is the proper thing to do in order that the laboratory will not be influenced or its findings be anticipated. Perhaps such individuals and their names are legion believe that the laboratory man when examining a specimen from an unknown source or environment will be placed upon his mettle and as a consequence, his work will be unbiased, unprejudiced and as a result more reliable. This condition of affairs not only shows lack of appreciation and lack of confidence but it also hampers, discourages and makes laboratory work very difficult and more arduous, and in many other ways constitutes a fatal error. We believe that if the practitioner or sanitarian does not possess sufficient confidence in the integrity and ability of the laboratory worker to take him into his confidence it would be much better for the success of the laboratory if he would rely entirely upon his own ability to help himself out of a difficult situation. If the

successful laboratory man is anything at all he is honest and conscientious to a fault. He could not be successful otherwise. He is perhaps not so prominent in the public eye, or so loquacious as his brother in the field, but his work is entitled to just as much appreciation and confidence. The work of the laboratory is frequently looked upon by the practitioner or sanitarian as being based almost entirely upon theory, and that all engaged in laboratory work are extremists and cranks whose ideas are only of value from a theoretical standpoint, but it is believed that some of the ideas, crude though they be, presented in this paper will help to dispel this delusion. If the prejudiced practitioner or sanitarian will only place himself in a position where no biologic agents are available for the purpose of diagnosing or for the treatment of disease with which they daily come in contact, they will perhaps then comprehend how dependent they are upon the laboratory for assistance. If the sanitarian had to abandon the use of tuberculin, mallein, etc., in the diagnosis and eradication of such diseases as tuberculosis or glanders or if the practitioner had to treat such diseases as fistula, cartilaginous quittors and many other local and general infections without the aid of bacterins, vaccines, serums, etc., they would probably then realize the necessity of the laboratory in which such agents originated and are produced.

Perhaps lack of recognition is to some extent due to the fact that the humble worker in the laboratory whose brain and energy may be responsible for the invention or production of some of those agents just mentioned, may be an individual who does not possess the authority to affix the major portion of the alphabet to his name to represent a degree or degrees. Perhaps he is entirely free from appendages of any nature of this kind, but degree or no degree his work should be his passport to scientific circles and he should be rewarded and endowed with the dignity commensurate with his importance as a benefactor to the human and animal weal. The lay, and we regret to add, frequently the professional public are prone to perhaps thoughtlessly overlook the importance of giving due credit and suitable reward to those whose daily vocation in the interest of scientific research and technique is perhaps one of the most dangerous, exacting and arduous of all vocations.

Perhaps another reason why the laboratory is more or less a failure is because of the fact that until the past few years few

of our colleges gave proper instruction or gave due consideration in the construction of their curricula providing for adequate laboratory instruction which would permit their students to acquire the ability of elucidating scientific etiologic problems or to recognize the necessity of elucidating them.

The practical value of any phase of medical science is dependent upon the general knowledge of such factor and the thorough understanding of the proper methods of its application. This naturally depends upon education. Educating the field worker and the laity along these lines bringing into prominence such knowledge as may be best suited and utilized for the benefit of mankind. With this end in view cooperation is needed on the part of the practitioner, sanitarian and all others interested in medical or sanitary work and is a necessity for the bringing of the laboratory to a high state of efficiency. Provisions should be made to bring the laboratory worker, field expert and all public spirited individuals who are directing their energy toward the improvement of human and animal health together at frequent intervals to provide the opportunity for discussions of medical problems in order to improve the efficiency of both branches of work. The failure of many biologic products, to prove beneficial when applied to the prevention or cure of disease, is due in many instances to the lack of ability or tendency on the part of the laboratory man to carry out practical details, and the lack of cooperation or perhaps knowledge on the part of the field man, of such products which have not yet escaped beyond the bounds of theory. We must realize in considering these questions as to theory or practice that we are confronted with two classes of men; the laboratory man whose intellectual energies are applied to the solving of problems regardless of their practical application or significance, and the field man whose sole aim is usually the application of specific knowledge and technique for the benefit of mankind. But, notwithstanding the above aims and objects of the two classes, their work is or should be inseparable in order to be effective, hence the need of due credit and reward being given to both in order that the public in general through such stimulation may reap a greater harvest as a result of cooperation.

In the past it undoubtedly appears that laboratory science has been considered a side issue in the application of medical science, when in reality it has already reached sufficient development to

constitute and be recognized as an independent science. Conditions should be promoted with a view of bringing about a better understanding of the vital relations of the laboratory toward the betterment of mankind and this, as has already been stated, can only be accomplished by the education of the lay and professional public. And when this time comes the laboratory will occupy a niche in the scientific world which its ability to produce results, entitles and qualifies it to assume.

As a general proposition laboratories maintained by the federal, state or municipal governments are characterized by a marked lack of adequate equipment and under the existing state of medical affairs, there is little if any incentive for the private laboratory conducted on a business basis to expend the necessary amount of money to place such institutions upon a proper foundation. In the case of laboratories maintained by government support, the general public and more particularly legislators have not been sufficiently educated to realize the vital necessity of properly equipping and maintaining through the medium of generous appropriations for the purpose of carrying on such work as is absolutely essential for the conservation of human and animal life. From an economic standpoint, it cannot be gainsaid that money properly expended in the equipment and maintenance of such laboratories, will return greater interest upon the sums expended than in any other investments of a like nature.

Unfortunately in the case of a private laboratory which depends upon its maintenance and welfare upon business principles entirely, it is found that those in need of laboratory investigations either do not recognize the value of such services or they hesitate to have such work performed unless it can be done by some government laboratory where the payment of a fee is not required.

Yet to the unprejudiced mind, the private laboratory is in its way as necessary for the conservation of human and animal life as the government institution and this fact should be recognized by all those who are interested in the various lines of work requiring laboratory assistance.

We believe the time is fast approaching when a definite understanding upon the question of establishing a line of demarcation between work that should be done by the publicly supported laboratory and the privately maintained institution of a similar nature. We know that under the present circumstances and

under the present understanding and conception on the part of the government laboratory man, that the government institution must do some poaching upon the private laboratory's preserves in order to convince the public of the necessity of supplying more adequate equipment and larger appropriations, and while the private institution admits the necessity of more generous financial support of the government laboratory it is more or less jealous and is liable to fight the palpable trespass upon its domain. This and other questions which we have attempted to raise should be and we sincerely hope will be discussed by this body representing as it does a section of an international organization whose entire membership is scientifically interested and perhaps financially involved as well.

SCLEROSTOMATOSIS* OF THE ARTERIES IN THE HORSE.†

By Samuel Howard Burnett,

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The diseases of the blood vessels form a very important chapter in special pathology and it does not seem that we fully appreciate the importance of the pathologic changes in the blood vessels. The symptoms are manifest in the organs supplied by the affected vessels or in the body as a whole. Attention is called to the blood vessels themselves rather infrequently and then only when the alterations have become pronounced. The body may lose much in efficiency before the seat of the trouble is located.

The blood vessels are often the seat of pathologic changes and a common cause in the horse is the larvae of *sclerostoma bidentatum* (equinum); this worm and the changes produced by its activity have been the subject of investigation for a long time. The earliest mention recorded was made in 1665 by Ruysch, who observed the aneurisms and in 1671, J. H. Schulze observed the presence of worms in an aneurism having walls three times the normal thickness. Since that time mention has been made of these worm aneurisms and the subject discussed at varying intervals by different investigators. The most notable work is that of Bollinger's, in 1870, who made the first complete investigation and gave the first careful description of the pathologic anatomy and the connection of the structural changes together with the altered function of the parts affected; his published work "Colic of the Horse and the Worm-Aneurisms of the Intestinal Arteries" is a classic. Since the publication of Bollinger's work many careful investigations have been made. The last ten or twelve years have been especially productive in research on the subject of the life history of the specific cause

*The term sclerostomatosis is used instead of sclerostomiasis because it seems to the writer that sclerostomatosis is the correct term. The name of the disease, in a large class of cases, is formed by adding *osis* to the stem of the name of the specific cause, or in some instances the name of a characteristic structure or feature of the disease. As examples may be cited coccidium—coccidiosis, actinomyces-actinomycosis, strongylus—strongylosis, tuberculum—tuberculosis. An analogous case occurs in the formation of the name of the disease when sarcoma is generalized, *osis* is added to the stem which is sarcomat.

†Contributed to the report of Committee on Diseases.

(*sclerostoma bidentatum*), the characters of this and its closely related species, and the structural changes produced. It is not my intention to review the extensive literature of the subject, references may, however, be found in the excellent paper of Adelmann, 1908, who has given a careful description of the morbid changes produced in the arteries. He made a careful study of eighty-five horses in each of which all the arteries were examined. A good description of the pathologic changes produced by sclerostoma bidentatum is found in Kitt's Lehrbuch der path. Anatomie der Haustiere, 4te. Aufl. 1911.

The purpose of this paper is to describe the tissue changes in the arteries produced through the activity of *sclerostoma bidentatum*. Although a good deal of excellent work has been done on the tissue changes produced, more work is needed especially on the sequence of these changes, which when fully known will solve an important part of the life history of the specific cause.

The alterations in the arteries are one effect of sclerostomatosis. The adult worms are found in the intestines of horses, adhering to its walls from which they suck blood causing at times a considerable amount of anemia. The larval worms are found in the tissues, often at considerable distances from where the parent worms are located; some of the larvae get into the arteries, but at present there exists some difference of opinion as to just how they find their way. The young worms evidently bore their way through, but just what route they take is not definitely settled. One thing to be kept in mind while considering the changes produced in the arteries is that the larval worms spend only part of their life there and larval worms beyond a certain size are not found in the arteries.

So far as the writer knows there is no reliable data as to the frequency of arterial sclerostomatosis in America. Kitt states that according to statistics collected by Roll and Bollinger seventy to ninety-five per cent of horses have aneurisms in their intestinal arteries. Adelmann examined eighty-five horses and found aneurisms in each one; this shows the frequency in Germany. It is not so abundant in eastern America, though a common disease. Dr. V. A. Moore states that he found aneurisms in practically every one of a large number of horses examined post-mortem in different parts of Montana. A letter to him from Dr. Duncan McEachran states that in certain parts

of Alberta the disease is very prevalent. He cited one large breeding ranch that was obliged to go out of business on account of the parasites.

The descriptions which follow were made from specimens in the collection of the department of comparative pathology in the New York State Veterinary College. One of the smallest changes found occurred in the posterior aorta (No. 537) of a colt that was badly infested with sclerostoma bidentatum; though one of the smallest as to the degree of structural change produced it is not necessarily the primary lesion and the change does not indicate that the worms passed through the walls of this large vessel.

The aorta is of normal size and appearance from the outside. On section the inner surface (Fig. 1) is seen to contain larval worms scattered from the aortic valves to the iliac arteries. They are about one and a half centimeters apart, but are not evenly distributed. These worms are firmly adherent to the intima, the head fastened to the wall, body projecting into the aorta or sometimes adherent to the wall by means of fibrin. About the worms are smaller or larger areas (Fig. 1) raised from one to three millimeters above the level of the surrounding intima; some of these areas are separate while others, especially on the ventral side of the aorta, are confluent, they are greyish to dark reddish in color, having a surface roughened by rather coarse or smaller rounded elevations or convolutions, each of which is so bent back and forth as to make S-shaped curves. These elevations appear to be due to exudate beneath or in the intima. The smallest of these elevations show as fine wavy lines on the intima, which as they increase in size become more and more convoluted. In some places where the surface seems smooth and nearly normal except for a few fine raised lines, one can make out with a low power hand lens that the surface is traversed by a network of these fine wavy lines; those large enough to be seen plainly with the unaided eye are more twisted or convoluted. The media and adventitia are of normal thickness and appear to be normal.

Microscopic examination of a section from a roughened area shows that the intima is very much thickened. The media appears to be normal. The layers of the intima are indistinguishable. The surface projects as rounded prominences. Within is fibrin, partly as dense masses and long strands and partly as

Fig. 1. Inner surface of aorta, No. 537 c, showing larval worms and acute fibrino-purulent endoartitis. X 1.

Fig. 2. External view of aneurism of one of branches of anterior mesenteric arteries, No. 201. X 1.

Fig. 3. Aneurism sectioned longitudinally showing inner surface. Note the worms and coagulated material. Internal surface roughened. Walls of aneurism very much thickened. X 1.

Fig. 4. Section of branch arteries and nerves, anterior root of mesentery, No. 558, showing some of small arteries with thickened walls, some completely thrombosed. X 1.5.

threads. Between the strands of coagulated material are collections of leucocytes, some of which stain well while other areas are much degenerated. The majority of the leucocytes are polymorphonuclears, many are eosinophiles, especially in the deeper part of the intima which contains connective tissue cells showing in some instances signs of proliferation. Between the cells is poorly stained material, partly fibrin and partly degenerated material, and leucocytes. There is a worm embedded in the intima about one-fourth the distance from the surface of the media.

The diagnosis of the condition found is *acute fibrino-purulent endoartitis.*

The internal iliac artery of the same case is somewhat enlarged, but the walls are no thicker (2mm.) than normally. The inner surface contains many larval worms attached to the walls. Areas of inflammation, similar to those in the aorta, are scattered over the intima. The external iliac is from three to four and four-tenths centimeters in diameter extending from the aorta for a distance of about fifteen centimeters. In general the enlargement is cylindrical, but with saccate, rounded enlargements two to two and five-tenths centimeters in diameter, giving it an irregular outline. The small branch arteries given off from the enlarged portion have thickened walls, one to two millimeters. Apparently the media is the part most thickened. The larger of these branch arteries are completely thrombosed, the smaller have some lumen. There are worms near the parent artery in some of the larger branches, those one centimeter in diameter.

On section the wall of the external iliac is very thick, with practically no lumen. The media is much thickened, about three millimeters; the normal thickness being about one millimeter. The intima is much thickened, but it is difficult to make out the boundary between it and the media. The adventitia is thick, four to thirteen millimeters (its normal thickness is less than two millimeters) due to an increase in connective tissue and the enlargement of small blood vessels, the vasa vasorum. The inside of the artery contains dirty greyish coagulated material containing many larval worms.

From the nature of the changes present one can readily see that the lesions found in the aorta and the internal iliac represent an early stage, while those in the external iliac have required a longer time to develop.

No. 201 is a specimen of a typical aneurism (Fig. 2). It is one of the branches of the anterior mesenteric artery about ten centimeters from its origin. It is oval in outline, and measures one and five-tenths by three by five centimeters. The wall of the artery in the aneurism is five to six millimeters in thickness. The adventitia is about two millimeters in thickness, the remainder being media and intima, but the boundary between them is indistinguishable. The normal thickness of the wall of the artery measured about two millimeters, a short distance on either side of the aneurism.

The inner surface of the aneurism is studded with areas varying from five to seven millimeters across, in which the intima is covered with greyish coagulated material containing a few reddish flecks. A few worms are found adhering to the wall. A mixed red and white thrombus occupies part of the lumen of the aneurism and extends beyond it. Evidently it was formed at the time of death.

Microscopic examination of a section of the wall of the aneurism shows the media and intima much thickened; the boundary between them indistinct. Near the adventitia the muscle cells and elastic tissue of the media are mostly old tissue though some of the cells have large swollen nuclei. The young cells are found especially alongside the lymph vessels and blood capillaries, whose endothelial cells have large swollen nuclei (young cells). In the inner part of the media the newly formed cells are more abundant, being especially numerous near the lumen of the artery. In areas there are very many formative connective tissue cells and a few young capillaries filled with blood. With the fibroblasts are some leucocytes, mainly polymorphonuclears. At the surface the tissue contains fibrinous exudate, several polymorphonuclear leucocytes and some red cells. A larval worm is embedded in the intima. In the lumen of the artery is a thrombus composed of threads and nearly homogeneous masses of fibrin containing many polymorphonuclears. There is also a parietal thrombus composed likewise of coagulated material containing polymorphonuclear leucocytes, and some red corpuscles, and the intima is infiltrated with these leucocytes together with small masses of red corpuscles. It contains a considerable amount of fibrinous exudate. The fixed cells show degeneration, there being a considerable amount of hyaline degeneration in the middle portion of the

intima, less in the inner portion. The fibers of the fibrous and elastic connective tissue appear swollen and homogeneous.

A considerably later stage is shown by No. 934b, which is a piece of the posterior aorta containing an aneurism five centimeters proximad of the anterior mesenteric artery. The aneurism is four centimeters in diameter by five and two-tenths centimeters in length. The walls are only two millimeters thick and feel as though they are cartilaginous. There is a thin, dark red layer of coagulated blood, two by four and six-tenths centimeters, located on the ventral side of the aorta just anterior to the origin of the anterior mesenteric artery; the intima is rough where the thrombos is attached. There is a shallow enlargement (two by two and six-tenths centimeters) of the ventral wall of the aorta just distad of the larger aneurism and a smaller enlargement one and five-tenths centimeters across, just distad of this one; the wall in these latter enlargements is thin and hard resembling that of the larger aneurism. In the larger aneurism the intima is thickened in areas by what seems a yellowish grey exudate—thicker near the anterior mesenteric artery, near which is a small round worm attached to the wall, part of its body projecting into the lumen of the aorta. The intima of the greater part of the aneurism is thin and hard, apparently calcareous. About the edge of each dilated part of the aorta is a narrow thickened rim, the intima of which is thin and calcareous while just beneath, the tissue resembles bone in hardness. The walls of the small branches of the anterior mesenteric artery show thickening to from two to three millimeters. Some of them are completely plugged; others open.

Another piece of the same aorta shows in areas endo—and mesarteritis. The intima is much thickened, with rough, eroded surface and covered by coagulated material. In one place is a parietal thrombus, one and two-tenths centimeters thick and two—and two and five-tenths centimeters wide, extending about ten centimeters lengthwise the aorta. In places the intima is swollen in different sized areas, each with a more or less convoluted or corrugated surface, attached to which are a few worms. The changes in the last described piece of the aorta are a little more advanced than those found in the external iliac artery previously described. In the aneurism of the aorta near the anterior mesenteric artery (No. 934b) a still later stage is shown, and in the greater part of this aneurism the inflammation had ceased.

A still later stage is found in No. 539, a portion of the posterior aorta containing an aneurism, six and three-tenths by seven centimeters, situated immediately posterior to the coelic axis, oval in outline with walls feeling as firm as the larynx, and cutting as though its walls were strengthened by bands of bone. The wall is from four to five millimeters in thickness, inner surface mottled and made uneven by yellowish to brownish yellow calcareous plates three to seventeen millimeters across; by small calcareous spicules projecting into the lumen and by shallow depressions where the intima is gone. There is a ring of hard thicker tissue about the proximal end of the aneurism. A few bony plates, one seven by seven millimeters and another seven by fourteen millimeters occur in the aneurism. Histologic examination shows that these contain osseous tissue, a condition that has been previously observed only a few times (Bollinger, Schlegel, Kitt).

The anatomic changes occurring in the smaller arteries seem to differ in some important details. An early stage is seen in small branches of the external iliac, No. 537, described above. On one side the wall is two millimeters thick, with the several layers distinct. The intima is about one-half the thickness of the media or adventitia, which are of about equal thickness; here the media is apparently normal. The adventitia is not appreciably changed except that the vasa vasorum are distended with blood. The intima is thickened, though the inner surface is smooth. The cells are separated by a fibrinous exudate, and a few eosinophiles are scattered through the layer.

On the opposite side of the artery the wall is four millimeters in thickness. Where it is the thickest the boundary between it and the media is indistinct. The fibers of the elastica interna spread out and can no longer be followed. In this place the boundary between the media and adventitia is also indistinct. The interna contains much fibrinous exudate, and near the surface there is a considerable amount of purulent exudate in areas; the leucocytes are mainly polymorphonuclear; some are eosinophiles. A few of the connective tissue cells are undergoing indirect division. Spaces of considerable size (serous exudate) occur in the interna. There is some fibrinous exudate in the media and adventitia. The endothelial cells of the capillaries in the media are proliferating and there are a few polymorphonuclear and eosinophiles with the newly formed cells.

A lesion often occurring in this disease is the increase in mesen-

teric tissue about the mass of small arteries issuing from the anterior mesenteric artery and the hypertrophy of the walls of these branch arteries. No. 558 (Fig. 4) shows this condition well. The specimen is a transection of a mass of tissue, three and seven-tenths by five and seven-tenths centimeters, containing blood vessels and nerves. The small arteries are twigs given off by the anterior mesenteric artery, and every one of these arteries has much thickened walls. The increase seems to be mainly in the media, although there is some increase also in the adventitia. One artery one centimeter in diameter has walls four millimeters thick. Some of the arteries are open with thickened walls having a translucent appearance, others are completely plugged, the thrombi presenting a translucent homogeneous appearance.

Microscopic examination shows that there is an increase in connective tissue in the adventitia and extending between the arteries; the media is much thickened, due to a proliferation of muscle cells, fibrin and leucocytes, many of which are eosinophiles. There is an increased number of capillaries, with cells showing large vesicular nuclei and in places there is some blood pigment. The outer part of the media consists of close strata of muscle fibers, interrupted in places where the boundaries of the media and the other coats are indistinguishable.

The interna is much thickened, containing fibrinous exudate and leucocytes, but it is not possible to distinguish the boundary between it and the media; many of the tissues cells are newly formed. Capillaries are present. The inside of the artery is occupied by a thrombus, composed of fibrin with occasionally some red corpuscles, and scattered leucocytes in greater number near the interna; along the edge of the thrombus are newly formed capillaries and young tissue cells growing into it. The process of organization is well under way.

SUMMARY.

The descriptions are arranged in series from the changes requiring the least time, to those that have existed the longest. This series however is not necessarily the order of events from the time the worms invade the arteries till they leave them; naturally they can not first affect the intima as they must bore their way into the arteries from the outside. The earliest change observed was an acute fibrino-purulent arteritis. It was not possible to

examine these preserved specimens bacteriologically. It is something very unusual for a fibrino-purulent exudate to be due to round worms, it is practically always the result of pyogenic bacteria. Inflammation began in the intima.

The exudative stage was followed by a degenerative and productive arteritis, with the deeper part of the intima and media most affected, while the boundary between the intima and media became indistinguishable, sometimes so between the media and adventitia. The proliferation may extend to the adventitia and the tissue surrounding the artery.

Finally, a condition similar to arterio-sclerosis in man supervenes. The feature of this stage is the marked retrograde changes that have occurred sometimes diffusely but usually in areas. Atrophy, degeneration, calcification, are present, and one or more thin walled aneurisms occur. In one specimen these are in the aorta. Arterio-sclerosis occurs not rarely in horses; the writer is not ready to say that this is always in cases of arterial sclerostomatosis, but it probably is so at least in nearly all of them. The aneurisms with hypertrophied, not calcified walls, as those often found in one or more of the branches of the anterior mesenteric artery, belong with the exudative, degenerative and productive forms of arteritis. Probably these thick walled aneurisms are situated where the worms bore their way through the arteries. The tissue changes are not like those that have taken place in what we might designate the arterio-sclerotic aneurisms.

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DISCUSSION.

Dr. Kinsley: I certainly have been greatly interested in Dr. Burnett's paper, and think he is to be congratulated upon the work which he has presented. As has been intimated, it is a most laborous task to determine

the species of the parasites that are the cause of the various disturbances in the arteries of the horse. Out in our section we find that parasitic disturbances are very common. Recently in the autopsy on twenty-five horses in southwestern Kansas which had apparently died from another cause, it was not difficult to demonstrate the presence of parasites in the blood vessels of quite a number. I remember one instance where the condition noted extended the whole length of the aorta, resulting in a condition very similar to arterio-sclerosis and I have often wondered whether such conditions were the result of parasites.

Dr. Ward Giltner: Is the arterio-sclerosis in the lower animal similar to that found in the human being? I have found the sclerostoma in Michigan, but have always thought that there are other causes for arterio-sclerosis. I would like to have the veterinary pathologists eventually answer that question, whether there is arterio-sclerosis in the horse such as we find in the human being?

Dr. Kinsley: I would like to express one thing, not particularly in answer to Dr. Giltner, but along that line. Some four years ago we had an opportunity to investigate the condition of a six-year-old Hereford bull. He had been affected with actinomycosis involving the submaxillary region. The difficulty had apparently been overcome by treatment, or, at least, seemed so for a while. A short time after that, perhaps ten days, he died, and at the autopsy, the posterior aorta for almost the entire length showed those characteristic lesions of which the doctor has been speaking.

Dr. Jones: Mr. Chairman, I would like to make a few remarks on the general subject of the discovery of these parasites. It seems to me as if the profession had neglected a great opportunity. We ought to have done more than we have in the way of the identification and classification of these parasites. A great many parasites may be recognized by the use of a simple hand lens. In one instance that I recall much difficulty would have been avoided if such a procedure had been adopted. It was in the case of a young horse which had developed some of these symptoms. There were three practitioners called in, one especially, having had considerable experience in the diagnosis of parasitic disorders. Not one of them was able to identify the parasite. It seems to me that by the aid of a hand lens, and any good text-book covering the subject the practitioner could probably identify most of the commoner parasites which cause considerable trouble.

The Chairman: The paper is now open for discussion.

Dr. Hadwen: Mr. Chairman: I have been very interested in this paper, because I think it is a very important subject. I recognize the difficulty in dealing with these parasites, which are internal, and which we cannot see. I believe we often pay too much attention to external parasites, and neglect the internal ones.

I would like to call attention to Dr. Loos' classification of the Sclerostomidae, I notice that Dr. Burnett refers to the aneurismal sclerostome, as sclerostomum bidentatum. This name, and likewise sclerostomum armatum and tetracanthum have been superseded. Dr. Loos has

made three genera out of these: The Sclerostomes, the Triodontophorus and the Cylichnostomes.

The first is the genera Sclerostomum, of which there are three species: sclerostomum vulgare, (or in the old classification sclerostomum bidentatum), this is the aneurismal one. Sclerostomum equinum, (or in the old classification quadridentatum), and sclerostomum edentatum.

Of the genus Triodontophorus there are two triodontophorus serratus and triodontophorus minor.

Then comes the genus Cylichnostomum (saucer shaped mouth) of which there are thirteen species:

Clylichnostomum auriculatum, Clylichnostomum poculatum, Clylichnostomum labratum, Clylichnostomum coronatum, Clylichnostomum bicoronatum, Clylichnostomum catinatum, Clylichnostomum calicatum, Clylinostomum poculatum, Clylichnostomum tetracanthum and Clylichnostomum labiatum, Clylichnostomum alveatum, Clylichnostomum elongatum, Clylichnostomum radiatum—which names, (the last four) I had forgotten at the time of the discussion.

This classification is well recognized abroad. The point I am anxious to emphasize, is that the life history of all these species is not fully known, for instance the larval form of Sclerostomum equinum is suspected of causing verminous aneurisms in the same way as Sclerostomum vulgare, so that it is very important to know what species we are dealing with.

Dr. Burnett: Mr. Chairman, as to the question of arterio-sclerosis, I know that that has been a subject of some controversy, but I did not mean to imply that this condition was due entirely and only to these parasitic worms. I presume there are other causes, but we know that that condition which has been referred to follows certain changes in the walls, and this exudate and inflammation is probably due to these bacteria. Just what part the worms play in producing that condition I do not know. The subject is one which will stand a good deal of careful study, and the study must, I think, be along the lines of pathology. The changes which take place are degenerative, and, without doubt, it seems to me, this may be due sometimes to one cause and sometimes to another. We know, in fact, that it is due to different things. But these changes in the blood vessels, however, produced, certainly have a great deal to do with it.

AUTOTHERAPY
OR
THE NATURAL TOXINS IN THE TREATMENT OF, AND AS A PROPHYLAXIS TO, DISEASE.

By Charles H. Duncan, M.D.,

New York City, New York.

Mr. President and Members of the American Veterinary Medical Association:

I am pleased to find that veterinary surgeons have such a keen appreciation of the value and the necessity of biologic therapeutics in the treatment of disease, and glad, Mr. President, to have the privilege and opportunity of appearing before such an intelligent body of professional men, explaining to them the technique of this new and latest addition to biologic therapeutics —autotherapy.

Autotherapy, as the name implies, is self-therapy or *natural* therapy; a name the writer has given to a method of treating disease with its own unaltered poison, and the very best method of treating many diseases. It is new only in the sense that the principles have never been understood and properly utilized before, but at the same time it is the oldest method of curing disease, for most animals have always licked and cured their wounds in this way. Curing disease with its own unchanged poison (*or with the exact substance that causes the symptoms*) dates back to the remotest antiquity. Medical writers of all ages have mentioned cures along the line of organo-therapy. It was well known to the ancients, and enjoyed peculiar respect during the middle ages. One writer mentions that "the hair of the dog will cure a mad dog bite;" another "snake bite will cure snake bite;" another, "The oil in which the scorpion had been killed will cure the scorpion bite," and there are many other examples of the same kind.

The year 1822 marks the beginning of modern biologic therapeutics, and it is altogether fitting and proper that I should pay tribute to a name that stands out sharper and clearer in many respects than all other names; the name of a veterinary surgeon,

one who is quoted by all the modern historians as being the father and founder of the idea that disease carries with it a remedy for its cure, a name with which perhaps many of you are unfamiliar. I refer to Doctor Lux, a veterinary surgeon who founded the system of medicine which he called "Isopathy;" a man we should all honor and cherish, for, Mr. President, the name of Lux links the veterinary physicians today with the modern and advanced conception of bioliogic therapeutics. I would suggest to you, his followers, the veterinarians of today, with your permission, that the discoveries of Lux be perpetuated even after the lapse of nearly a century through a suitable memorial in the shape of a tablet or statute to his memory, this as an incentive to high ideals and earnest effort.

Lux began using autogenous products in the treatment of diseases for he says, "I picked phlyctenicle off a sheep's ear that had come down with anthrax, diluted the pus with water, and gave it to the sheep by the mouth. The sheep was cured. I then gave weak dilutions of this water to the rest of the members of the flock for all had been exposed, and none of them contracted the disease." Let us pause right here and emphasize the importance of using the unchanged natural toxins as a prophylactic for disease, the exact toxins against which the tissues react, when a natural cure is brought about. The above toxins are the best immunizing agents both for prophylactic and curative purposes; their therapeutic values have not been changed in the laboratory, as they are the exact toxins of the disease. Lux then drifted into using heterogeneous products or stock solutions, with which he was often unsuccessful because of their uncertain cure and, as a result, his system of medicine passed into history to remain until the writer again took up "isopathy," throwing a new mantle about it and in the light of modern medical research placing this system of medicine on a firm scientific basis.

Some fifty years after Lux, Koch made his name immortal in medicine by giving to the world "tuberculin," an isopathic remedy pure and simple; Pasteur did practically the same thing immunizing against hydrophobia with the heterologous virus of rabies. Without detracting in the least from the honor achieved from their other discoveries, the fact remains that the work which made their names almost a household word throughout the world was founded on isopathy. They followed closely in the footsteps of Lux and made the same mistakes.

About the year 1900 *Sir Almrath E. Wright* gave to the world his famous opsonic theory. The writer believes that the greatest thing in this discovery is that the product of disease to more readily facilitate cure must be autogenous. Wright, however, alters the therapeutic value of his vaccines by an elaborate process which they undergo in the laboratory during preparation; their therapeutic value being lowered or changed by heat; through being grown outside of the body tissues, in foreign culture media, and for many other reasons that will be pointed out later. It is generally accepted that when nature cures a localized infection, such cure is induced by the escape of disease toxins from the infected area into the general circulation, this occurring, the healthy, tissues build up a resistance to the toxins, and the power of the serum is increased; the activity of the leucocytes is stimulated to overcome the invading microörganisms, etc., and the patient recovers. Thus nature cures infectious diseases with the exact toxins that are in the tissues or that cause the symptoms.

In the early part of the year 1908, recognizing what had been done by these pioneers of medicine, at the same time observing the familiar spectacle of the dog licking and curing his sores but noting that the only place bad infection occurred was on the head, where, because of anatomic reasons it is impossible for him to lick, the writer began making clinical tests towards curing disease with its own unmodified toxins by placing the patient's own pus in his mouth similar to the way nature does. The results were so startling, gratifying and positive that he was encouraged to continue these tests until most remarkable cures were brought about even in well advanced and apparently hopeless cases of sepsis. Many of these cases were the most severe it is the lot of the surgeon to see. Since then he has used this method thousands of times, and many others are using it in their daily routine practice. The writer published a paper in the Medical Record, September 16, 1911, and also in several other medical papers, and as a result has received reports from physicians from all over the United States and other parts of the world who are using this method successfully in their practice. While professional endorsement of a new therapy is a compliment, it is really an acknowledgement of its therepeutic value—the all important factor in the treatment of disease.

A few of the many endorsements received are given below:

"Portland, Oregon, Dec. 15, 1911.

"Dear Doctor Duncan:

"Immediately on reading your paper in the Medical Record, September 16, 1911, we earnestly and enthusiastically followed out your suggestions with most gratifying results, have presented a paper on the subject to our little society out here, etc.

"Most Sincerely,

"John Besson, M. D."

General Hospital and Training School for Nurses.

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"New York City, March 14, 1912.

"Dear Doctor Duncan:

"The following case may be of interest to you, as it was treated by your method December 15, 1911. Gussie K., age nineteen, came to my clinic, suffering from one of the most severe pus infections that I have ever seen, in the right forearm, lower third. There were a number of large pustules, the discharge was thick and yellow, the inflammation quickly advanced up the arm infecting the whole area. The region being an edematous, boggy mass, there were multiple openings discharging pus."

"The patient was anemic and poorly nourished. The treatment consisted of antiseptic cleansing and aspetic dressings. The indicated remedy was given to the best of my ability for four or five treatments, but it did not result in improvement. Then I decided it would be a good case to try your natural autogenous toxin treatment. I quietly laid aside one of the cotton wipes saturated with the pus without attracting attention. When she had gone I placed it in an ounce of sterile water. When she came in the next day to have dressing done, I brought in a two-dram vial full of this water. After putting in some four or five cane tablets, shaking them to dissolve their substance, to give the impression of mixing the medicine, I gave it to her and directed ten drops to be taken every three hours in an ounce of water. This was Friday. When the patient came in Monday the greatest improvement in condition had taken place. There was no discharge, pus dried up. edematous appearance gone, leaving the area of skin very red with a handsomely shaped arm and wrist. She came in once more the second day following for observation when the case was discharged as cured."

"Amputation has been performed for much less severe conditions."

"To be very frank, I never saw a remedy act so quickly and beautifully in my life."

E. E. Mills, M.D.,
326 East 58th Street.

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Dr. Marshall W. Duffie, of New York City, at a recent meeting of the Medical Society, presented the charts from the Metropolitan Hospital of two extremely severe cases of purulent infections, where the temperature came down in four days. He

stated that in view of the extreme conditions of each case, and the high temperature, 104 degrees and 104.5 degrees Fahrenheit respectively, a report of the fact would be interesting not only because the treatment was new but that the cure was so quick and complete.

The technique consisted of giving the patients three or four drops of crude pus covered by a little granulated sugar as a dose by the mouth.

Three doses were given one hour apart. Both went on to an uneventful recovery.

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"Omaha, Neb., February 2, 1912.

"Dear Doctor Duncan:

"I am working along the lines you have suggested in your articles on autotherapy, and have a number of cases that prove your contention, etc.

"ALFRED S. MATTSON, M.D., Bee Building."

* * * * * * * * * *

Dr. J. Hubby Schall, a prominent surgeon of Brooklyn, reported the following case of furunculosis cured by autotherapy.

"Upon the suggestion of Dr. Charles H. Duncan, I tried the autogenous virus in one case of severe furuncle. A few drops of the patient's pus were mixed with sugar of milk, and given by the mouth; only one dose. This case I watched with much interest, the patient made better progress towards complete recovery than eleven other cases treated by other means. At the end of the fourth day the redness and swelling disappeared, and by the eighth day nothing but a slight induration remained at the site of the former large and severe furuncle. This method deserves consideration."

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Prof. William H. Freeman says, in response to a letter of inquiry, regarding his experience in this treatment:

"As the result of ten months' experience in the use of filtered sputum hypodermatically in the treatment of pulmonary envolvements, especially pulmonary phthisis and chronic bronchial affections, I am convinced that this new method is one of the great therapeutic advancements of the age."

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Dr. George F. Laidlaw, Professor of theory and practice of medicine, whom we all know and love for his high mental attainments and profound knowledge of medicine, and because he is just, says:

"While this treatment is new, it is not a wild experiment. It is the logical conclusion of the work of Koch, of Pasteur and of Wright with

their vaccines. It is merely one step forward in the regular development of bacteriologic therapeutics. Dr. Duncan has solved a problem that has been germinating in medicine for over a thousand years."

Dr. James Law, emeritus professor and ex-dean of the New York State Veterinary College, says:

"This is one of the great therapeutic advances of the age. Dr. Duncan has rightly said his method of curing disease is the *natural method.* By means of autotherapy the physician may assist the tissues in bringing about a natural cure in more than fifty per cent of diseases that occasionally recover by themselves."

Dr. D. J. Mangan, veterinarian to the street cleaning department of New York City, after making hundreds of tests on animals, says:

"The brilliant results I have witnessed after the application of this treatment has made me feel that to ignore it in pyogenic infections would be nothing short of criminal neglect on my part."

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"Louisville, Ky., April 10, 1912.

"Dear Doctor Duncan:

"I have been very much interested in your papers on autotherapy. On several occasions I have followed your treatment of wounds with success."

"The following cases may be of interest to you:"

"John Kelly, laborer, while working January 10, 1912, in a sewer manhole about twenty-five feet deep was hit over the head and hand by a board when the rope broke. I put six stitches into the scalp wound, and brought the wounds of the hand together with adhesive plaster. The scalp wounds healed promptly but the hand became infected, and on January twenty-second I advised him to suck the discharge. Saw him on the twenty-third and the bluish chromatization almost disappeared. On the twenty-fifth of January case discharged cured."

"Edward Carlin, night watchman, has had carbuncles and boils almost all his life. He consulted me on December first, 1911. After lancing his carbuncle on the arm, I prepared a weak dilution from his pus which I gave him internally. Parts healed promptly, of course, but that he had no more of them since seemed to be remarkable."

"Alexander Vertes, M.D., Ph.D.,
"Gurthic Coke Bldg."

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Letters of inquiry regarding this treatment have been received from many parts of the world.

Autotherapy is not a cure all, neither is any other therapy. Autotherapy offers a verdant and practically untrodden field for therapeutic investigation. The serious nature of many diseases

that have been cured by autotherapy is not disputed and progressive results may confidently be prophesied in the treatment of many diseases by employing its principles. Just how many, clinical experience alone will tell.

The writer has made tests of treating fresh wounds by placing them in the mouth and finds this is a certain method of aborting purulent infections. How often we hear of a surgeon having infected his fingers during an operation and of his dying of purulent infection! If the surgeon will stop right there, suck the wound, and suck it thereafter whenever there is irritation in it, there will be no more deaths from this cause. I have never seen a case of purulent infection in a wound where this treatment was employed; that is, where the fresh wound was placed in the mouth, and I have treated thousands of cases, of wounds in joints, wounds with fish knives, bites from animals, etc., etc., where without antiseptics, infection seems to be imminent. In punctured and gun-shot wounds, where foreign material (as cloth or wood) is forced into the tissues, if the material is removed (before antiseptics are applied) and placed in the patient's mouth after he has come from under the anesthesia, there will, in all probability, be placed in the mouth some of the microörganisms that entered the wound, and we know when this occurs, there will be a tendency to prevent the infection. This is especially applicable to wounds of the brain and lungs for here infection usually means death.

The writer has a record of a number of cases of puerperal sepsis and septic abortions cured by this method both by himself and other physicians, who are interested in the development of this new therapy. The technique in puerperal sepsis and septic abortions is as follows: When the temperature rises, the abdomen becomes tender and the discharge foul smelling, face red, etc., etc., take about a cubic centimeter of the lochia or cut out about a square inch from the vulva pad that is the most stained, place it in a four-ounce bottle of water and shake well. Of this give the patient a teaspoonful (of the decanted solution) every four hours for four doses, then stop. The temperature dropped to normal in from twelve to forty-eight hours in several cases where this was tried, and the writer has seen no failures where this technique was employed. As it was found that a solution of water and lochia may be filtered with a Berkefeld filter and the filtrate injected hypodermatically with equally good results, it

dawned on me that it was the toxins, the natural toxins, the ***toxin complex*** that is curative, and realizing that it was with the natural toxin complex that nature cures severe infection we began separating the toxins in the discharge of the disease from the bacteria and all other extraneous matter using the above filter for this purpose.

As a result of clinical experience the following general rule or principle of autotherapy was formulated:

GENERAL RULE FOR AUTOTHERAPY.

When the pathologic exudate or the end product (or a dilution of the same) of any localized, loosely localized and possibly non-localized infectious disease is filtered with a Berkefeld filter and the filtrate injected hypodermatically, or placed in healthy tissues, antibodies specifically corresponding to the disease will tend to be developed; there may be exceptions to this rule but if there are, the writer does not know of them.

A corollary of this general rule of autotherapy may be stated as follows:

In extra-alimentary and extra-pulmonary localized, loosely localized and possibly non-localized infectious disease, if the crude discharge of the toxic end product of the disease is placed in the mouth, or if the discharge or a dilution of it is filtered with a Berkefeld filter and the filtrate placed in the mouth or in healthy tissues or injected hypodermatically it will tend to curse the disease.

It will be remembered in this connection that the dose by the mouth is always larger than when administered hypodermatically. The live microörganisms in the discharge when taken by the mouth develop nascent toxins. They are most efficacious and curative. In an earlier paragraph it was mentioned that the therapeutic value of the vaccines prepared according to the Wright and Douglas formula is lowered by the process which it undergoes during its preparation. In the opening paragraph describing the method of preparing his vaccines, Dr. Wright states, "Isolate in pure culture the causative microörganisms." Then he proceeds to lower its therapeutic value by heat, etc., as explained earlier. As a matter of fact, we are not always certain of isolating the causative microörganisms and even when we succeed it is often so changed or contaminated during preparation that it has little or no therapeutic value; it ceases

to be, as originally, one of the exact substances causing the symptoms of the disease and its therapeutic value has been changed.

Bail, the discoverer of the doctrine of aggressins, showed that in every infected area there were bacterial toxins, also that there were tissue toxins corresponding to each bacterial toxin, such as enzymes, ferments and toxic results of chemical changes in the protoplasmic molecule; he further showed that the pathogenic activity of the bacterial toxin is intensified when in the presence of its corresponding tissue toxins, and that it is the tissue toxins that cause wound fever in clean wounds; in other words, that healthy tissues react against tissue toxins as well as against bacterial toxins. His work was a laboratory determination, and was not used for therapeutic purposes as employed by the writer.

The toxins or end products of infectious diseases are thrown off in the discharges and when the discharge is passed through a Berkefeld filter at any stage of the disease we mechanically separate all microörganisms, mucus or other extraneous matter; thereafter there remains in the filtrate *all of the toxins from both the causative and complicating microörganisms, and also all of the tissue toxin in addition.* In other words, we have all of the *exact substances* that caused the symptoms in the individual patient, the *toxin complex.* By this method we are able exactly to meet each stage of the disease with its corresponding remedy for that particular stage.

The advantages of autotherapy over natural therapy are as follows: When nature cures a severe infectious disease we believe it is on account of the toxins escaping into the *blood stream.* Laboratory experience in the development of the antitoxins clearly indicates that when toxins are injected into the blood stream but few antibodies are developed but that when they are injected into the subcutaneous tissues antibodies are developed in large amount. The auto therapeutic method of injecting the toxins into the healthy subcutaneous tissues develops *more specific antibodies than the natural method;* again the physician may often inject the natural toxins in healthy tissues before the slow natural method of escape takes place he then *steals a march on the slower natural method,* curing or aborting the disease in its incipiency. When the physician does this early the patient is in better condition to abort or establish a resistance to the toxin elaborated during the disease; the system has not become reduced by the coincident fever; the duration of the disease is thus shortened

and health is preserved or recovery quickly ensues. Autotherapy or the physician's method of assisting nature in curing disease is better and acts quicker than the natural method. These distinct advantages are apparently not open to controversy.

It may be well to pause here and caution the reader against giving the second dose of the natural toxin complex too early. In purulent infections *a second dose must not be given as long as the discharge is thin,* for this is an indication that the curative reaction is continuing. If more is given at this time it will tend to injure the patient. When the discharge again becomes thick give another dose. Often two doses are sufficient to cure even the most severe infections, at times more injections are needed. Each case must be individualized and by following the rule of watching the discharged and the clinical symptoms we will seldom encounter trouble. Do not give more injections in any disease, as long as the patient is improving on the former dose.

During the intermediate stage of an infectious disease we will occasionally meet with failure. This is on account (the writer believes) of a negative phase or general systemic toxemia; when this is so, very small or extremely attentuated doses are indicated because the usual dose would only add fuel to the flames.

An advanced or severe infectious disease is usually a mixed infection there usually being several other microörganisms besides the principle causative one present, these acting as complicating factors.

The reaction to a disease to be most curative must be against all of the exact toxins which develop symptoms; that is, the toxins of the complicating organisms and their tissue toxins as well as the toxin of the causative bacteria and its corresponding tissue toxins. If there are four complicating microörganisms, we will have a set of at least ten toxins from which this patient suffers. Speaking of these collectively as the toxin complex we find it to be the exact substance which causes the symptoms of the disease and it is this exact substance that the tissues *utilize* when a spontaneous cure is brought about without any other medication. These ten toxins spoken of collectively as the toxin complex, is the substance the tissues *need* in order that a natural, specific reaction may be brought about. The autogenous vaccines prepared by the *old* and *faulty* method of Wright and Douglas contain only *one* of these toxins and even that is of lowered therapeutic value.

Disease is the name we give to a group of symptoms caused by one or more toxins. Disease may be said to be the language of toxins or the proving of toxins, while a symptom is the manifestation of the action of toxins on certain tissues of the body. The cure consists in placing these toxins in healthy tissues and the reaction to these toxins by the healthy tissues is the specific reaction to the disease. The tissues tend to eliminate the toxins of the disease out of the body in the discharges or waste products. Then it is clearly the duty of the physician in order to cure the patient in the easiest and quickest manner possible to hunt for the pathologic discharges, studying each disease by itself with this end in view, in order that he may be able to obtain the autogenous toxin complex for auto-therapeutic purposes. The autogenous toxin complex is the exact remedy that causes the symptoms, nature's remedy. Dr. Wright's autogenous vaccine is an inexact remedy, it is not exactly nature's remedy.

There is no certainty that two patients suffering with the same disease will have the same or even similar symptoms. If the symptoms of one sufficiently resemble the symptoms of the other the toxins of one will tend to cure the other, but where the symptoms of one do not bear sufficient resemblance to the symptoms of the other the toxins of the one will have no therapeutic effect whatever on the other, and will tend to be harmful. For this reason we can readily see that giving Koch's old tuberculin or any other stock preparation is wholly unscientific; it is pure and simple guess work. The question we have all sought to answer is, "Who will Koch's old tuberculin cure?" Heretofore, there has been no answer to this nor will there ever be until the symptoms of the patient from whom it has been taken are accurately recorded, then if it be given to a patient with a similar set of symptoms it will tend to be curative. In patients with sufficiently similar symptoms it will tend to have some therapeutic effect, but in all others it will have no therapeutic effect and will tend to be harmful.

Giving the polyvalent stock vaccines or the shot-gun prescription of using microörganisms of the same disease from a hundred different sources appears to be unscientific. It is claimed that if one of the number has no curative effect, another one in this conglomeration will, if then this is the reason for giving the polyvalent stock vaccines, it is wholly unscientific.

No other biologic preparation but the natural autogenous toxin

complex contains all of the toxins from which the patient suffers and no other biologic preparation is nature's exact remedy; neither will any other biologic preparation cure disease as well as the toxins, manufactured in nature's own laboratory, they are natural unchanged toxins. We prove our toxins in the laboratory on the guinea pig and the symptoms are the result. Disease proves its own toxin and the symptoms are the result.

A curative strain then, may be said to be, a toxin of a microörganism that has developed symptoms in a patient similar to the symptoms of the patient to whom it is given as a therapeutic agent. In the immense number of toxins that have no therapeutic effect as in the polyvalent vaccines we have agents capable of causing much harm as these tax the patient's strength at the very time when the system is the weakest.

Biologic investigators have never grasped or understood the fact that the unmodified substance that causes the symptoms of disease is the ideal substance to cure that condition even though they have generally recognized that this is the way a natural cure is brought about.

Bacteriologists have been working mainly with the body of the bacteria or their toxins artificially elaborated or prepared, with the object in view of removing or reducing the toxin element and preserving the therapeutic properties. They have utterly failed to grasp the idea that the toxic element developed during the course of a disease is the substance that *causes* the symptoms of the disease, and that if this combined toxic element minus the organisms is placed in healthy tissues, the tissues will tend to react to it, and that this reaction is the specific reaction to the disease. If the autogenous toxin is too toxic, diluting it properly reduces its toxicity but does not destroy its therapeutic effect.

The *prevention* of disease has within the past few years received much attention from the medical profession, and possibly greater strides have been made in this branch than in curative medicine. The unaltered toxins that are developed in the human body are the ideal prophylatic and immunizing agents. These toxins pass through the filter, and when they are injected hypodermatically in patients or animals that are exposed to disease it will build up antibodies specific to the unaltered toxin and therefore to the disease; in many diseases it may be given by the mouth for prophylactic purposes with equally good results. When you place in the system any toxin, the tissues tend to develop resistance

to it; when you inject the unaltered natural toxins of disease from the human body, into a human body, the exact resistance to the unaltered toxins of the disease will tend to be developed.

Let us again refer to the long forgotten work of Lux who immunized sheep against anthrax. He gave a weak dilution of pus from a sheep that had the disease to all the rest of the members of the flock that were exposed to anthrax and none of them came down with the disease.

Not being a veterinary surgeon, it will be my object to point out mainly the principles of autotheraphy, for when the principle is once understood the practical application is comparatively simple. Of course, the dosage and the repetition of dosage will have to be worked out for each disease. There is no subject in medicine where there is as great a diversity of opinion as the subject of dosage, and in this comparatively new field of therapy it is a subject of which we know but little.

The criticism of this method as being crude is unjustifiable for, with a skilled appreciation of the nature of the infection, the response of the individual, the stage of the disease, etc., the dose can usually be fairly gauged and readily confirmed by experiment. It will be remembered in this connection that the dose of vaccines by the methods now in vogue is to a great extent experimental.

There is no doubt that many of you are now thinking of the practical application of autotherapy to diseases in animals with which I perhaps am wholly unfamiliar. It is said that equine influenza, purpura, distemper, anthrax, glanders, etc., are due to bacteria that can be filtered out of the discharge. It this is so, and you have the means at hand for readily determining it, there appears to be no doubt but that these diseases, and many many others may be cured and prevented by injecting the proper amount of the filtered natural toxin in the manner described. Other animals that are exposed to diseases may be prevented from contracting or rendered immune to the disease by injecting as a prophylactic some of the filtered toxin, of an animal that has previously contracted the disease, this being the ideal prophylactic or immunizing agent.

While we are on the subject of prophylaxis or preventative medicine, I want to refer to an extract taken from Test's Materia Medica and Therapeutics, published in 1854 by Rodemacher and Sheets of Philadelphia as translated from the French, page 569:*

*The writer is indebted to Dr. Joseph Beatty for this reference.

"It appears the following procedure is resorted to in Russia to prevent the development of hydrophobia, and that the proceeding is generally successful, or rather infallible. When in a pack of hounds, one becomes rabid or is bitten, all the rest are set against him, and he is soon torn to pieces. Several of the pack are bitten, of course, but this is not heeded, provided they are permitted to swallow some of the blood of the dog. If any of the dogs should not have licked any of the blood their faces are rubbed with the bloody flesh. No one of them is attacked with the disease in such a case. The same proceeding is employed in regard to man, with this difference. Some of his own blood from his own wound they drink instead of the dog's on the same day or the day after the bite was inflicted. These facts were related to me by a man of high standing and high intelligence, and are worthy of all confidence. He, himself, was bitten in the right hand by a mad wolf and it is this very treatment that saved him from the terrible consequences of such an accident. Other intelligent Russians have verified these statements."

The writer merely cites this as possibly throwing some light on the very dark subject of hydrophobia. It appears to have an auto-therapeutic significance, agreeing as it does with the experience of dog catchers, cited in a former paper.

*The writer has cured many cases of pneumonia by injecting a dilution of the filtered sputa hypodermatically. The temperature will usually become normal in from six to ten hours. It has a tendency to cure even old alcoholics who have little reactive power. The writer is making tests of pulmonary tuberculosis by injecting the autogenous filtered sputum hypodermatically with apparently the best results. From the first to the seventh day after the first injection the patient will begin to feel marked beneficial effect, they often have a sense of well being and relief in the chest within twenty-four hours. The cough is not so hard and it is easier for them to breathe. They immediately and progressively begin to improve in every way.. Their sputum will markedly lessen within ten days or two weeks, and in some cases it practically stops. The appetite increases, night sweats cease, and the usual evening rise of temperature subsides, in almost every case within ten days.

Every case the writer has treated by this method has been

*Thoroughly mix one part of supta with ten parts of water, filter and inject ten mimims hypodermatically. If the temperature does not come down in twelve hours give another dose. In profoundly toxic cases give a highly attenuated dose.

cured or is on the high road to recovery. There is a warning I would like to give, *i. e.:* That there is nothing in medicine that requires greater skill than the administration of the tuberculin toxin for if too much be given, or if it be given too often the patient will be permanently injured.

The writer has cured many cases of acute gonorrhea by giving the patient the filtered dilution of the pus by the mouth and also by injecting the filtered dilution of the pus hypodermatically. We recommend, however, that the filtered toxin complex be given by the mouth, altogether either method as the physician prefers may be given with equally good success. The technique of giving the filtered toxins by the mouth is as follows: Irrigate the urethra with about two ounces of water daily. Filter this fluid with a Berkefeld filter and give a teaspoonful of the filtrate every three hours, watching for aggravations or the negative phase to set in; should this occur, stop the medication till the positive phase sets in. The inflammation will usually subside in from two to three days and the urethral discharge stops in from four to ten, rarely will it continue longer and only rarely will the negative phase be appreciable. Make a fresh solution every day.

The writer believes that he cured a case of bloody dysentery by injection of a dilution of the filtered stool hypodermatically and recommends that tests be made with a view to curing cholera, typhoid fever, etc., in a similar manner. Can asthma be cured by injecting the filtered sputum? Occasionally the asthmatic patient has some little sputum. In pneumonia only about a cubic centimenter of sputum is necessary to perform a cure and often only one injection is necessary. It is altogether possible that there will be sufficient sputum in many asthmatic patients to perform satisfactory tests.

There is one point that I wish to make so very plain that there will be no possibility of misunderstanding it, and that is: When may the discharge be given by the mouth and when may the filtrate be given hypodermatically? We will take gonorrhea for example. There are two ways of curing a gonorrheal urethritis; first, giving the crude pus by the mouth; second, filtering a dilution of the pus and either giving the toxins by the mouth or injecting them hypodermatically. In a gonorrheal ophthalmia there is only one way and that is by injecting the filtered toxins, the eye is connected directly with the alimentary canal by the tear ducts and giving it by the mouth would have no therapeutic ef-

fects. These tissues are involved and it is healthy tissues that develop specific antibodies.

Brief resumé of the technic of some common infectious diseases. Purulent infection—

℞.

Pus	dram	j.
Water	oz.	j.

Mix. Mix in a bottle with occasional shaking.

Sig. Place in the throat with a syringe.

If no change occurs within forty-eight hours give another dose. Never give more as long as the patient is improving or the discharge is thin. When the discharge becomes thick give another dose.

Pneumonia—

℞. Prune juice discharge from the nose	dram	j.
Water	oz.	j.

Mix. Mix in a well stoppered bottle, let stand twelve hours with occasional shaking. Filter and inject a dram hypodermatically.

Rarely will a second dose be necessary. If the injection is given within three days after the initial chill the temperature will usually drop within twelve hours.

This last proceeding is the one the writer would suggest in treating other diseases. The fresh toxins are not so very toxic, and this treatment the writer believes is safe, but clinical experience alone will tell, the best method to pursue. The eyes of the medical profession is on you veterinary physicians, for our best information concerning the therapeutic value of many biologic preparations have come from animal experimentation. When you obtain results publish them, the profession is waiting for your results. The veterinary physicians in the east are unanimous in vouching for the specificity of autotherapy.

If there is any information the writer can give any veterinarian just write to him and he will gladly answer all inquiries.

DIRECTIONS FOR USING THE FILTER.

The apparatus the writer uses for auto therapeutic purposes has been designed especially for the use of the physician, either at the bedside or in his office. The clinical or bedside filter is put up in a case, the whole apparatus may be sterilized in the office and it may not then be opened till at the bedside. The pressure on top of the filter is obtained by means

of an atomizer bulb that forces air through a perforated rubber stopper, that fits into the top of the filter. The air pressure forces the *toxin complex* through the porcelain part. This is the simplest and cheapest apparatus and is called the "Autotherapeutic Apparatus No. 1."

The filter that is designed for office use has a part that screws on the faucet called a syphon. The water when turned on creates a suction of about twelve pounds pressure to the square inch, tending to suck the toxin complex through the pores of the filter. This is called the "Autotherapeutic Apparatus No. 2." The only difficulty in using this filter is the amount of water that is used. This, in the cities, would amount to little, as the time for filtering is usually about ten to fifteen minutes, but in the country it may be a prohibiting feature that would not warrant its universal use.

For the use and convenience of country practitioners who may have a limited supply of water under pressure, an "Autotherapeutic Apparatus No. 3," has been designed which consists of an iron tank of cylindrical form about fifteen inches high and ten inches in diameter. The water from the mains is let into the bottom part of this tank, the top is connected with the filter by means of suitable rubber tubing. When water is turned on it rises and compresses air, which in turn presses on the substance to be filtered tending to force the toxin complex through the porcelain part. Only about a quart of water is run in the tank when the water is turned off.

The second and third apparatus may be started going and a physician may then leave, returning in about half an hour. The filtrate is usually colorless and perfectly transparent. It is the writer's custom to use one part of the discharge of the disease to from one to twenty parts of water, depending on the nature of the disease, and condition of the patient. These are placed together in a bottle and thoroughly shaken, allowed to stand for from about twelve hours with occasional shaking. This mixture of water and end product is then placed in the filter. The toxins in the discharge will tend to go into solution. Toxins from the microörganisms that are usually considered as having little or no extracellular toxins have been proved by clinical experience in all instances where it has been tried to have sufficient extracellular toxins for therapeutic purposes. It may be that some of these toxins are developed by autolysis, that is the microörganisms themselves will be destroyed by the agitation and the toxins in their body go into solution. At any rate these autogenous toxins have been proven to have the highest therapeutic value where used in this manner. The filters should be boiled for from fifteen minutes to half an hour, both before and after using. After using, the cylinder should be taken apart and rinsed under a running faucet and the accumulated matter brushed off lightly with a small moderately soft scrubbing brush. At each brushing a very thin surface layer of the surface itself is brushed off, thereby one regains a new filter surface. Before a new filterer is put into use it should have water run through it for it will run cloudy for a few minutes. The filters are so constructed that all parts are detachable to admit of thorough cleansing and sterilizing. There is no place where dirt can lodge. The material

that passes through this filter is perfectly sterile and the toxins are not changed by the process of filtration.

If it is deemed advisable, a new porcelain part may be purchased for each patient as the cost is but moderate. In the interim between uses, the filterer should be reversed and distilled water passed through it. A filter of this nature may be employed for years if proper attention is given to it. A number of extra washers should be purchased to be at hand.

DISCUSSION.

Dr. Mohler: I would like to ask the speaker if he has ever noted any anaphylactic symptoms in the patients treated with more than one dose of the protoid material which he has described?

Dr. Duncan: I have found that in giving the second dose in pulmanary tuberculosis only it should be watched very carefully. For that reason I give a very minimum dose. I do not know whether it is anaphylaxis or not, but by giving an extremely minimum dose I get very good effects.

Dr. Reichel: I would like to ask the doctor in regard to his experience with the filter, how long the work has been going on and how often he has had secondary infection at the point of inoculation?

Dr. Duncan: These biologic laboratories use the Berkefeld filter alone for sterilizing the antitoxins of diphtheria and tetanus. If these filters did not sterilize these products they would not use them, for they require the best. It requires but little skill in handling. I have used one filter for eight months without changing the stone. Of course I have not told you how to sterilize the filters; that was included in my paper, but they should be tested about every few months or oftener if you want to be certain of your product. The cast of the stone is only slight and you can purchase a new stone for each patient if you wish.

Dr. Ranck: What would you do in a case of rabies?

Dr. Duncan: The filter is not applicable to those diseases whose virus or microörganism pass through it. There are comparatively few localized infectious diseases in the human body but the microörganisms will be caught and strained out by the filter.

Dr. Reichel: A preparation of diphtheretic toxin and antitoxin are not destroyed in that way; they are destroyed by heat. I would like very much for Dr. Duncan to answer the question of how often he has experienced secondary infection at the seat of inoculation.

Dr. Duncan: Never in my life.

Dr. Kinsley: I have been very much interested in this paper. It seems to me this is simply the application of homeopathy pure and simple so far as I can see. That is, you are practically giving that which causes the disease to cure the disease, but probably in smaller doses.

There are some other points connected with the paper that interest me. In another way it seems as though the doctor is applying the principle that has been published by Ross, of the use of metabolic products in

stimulating the healing of wounds or increasing resistance to disease. As has been many times stated, we live and grow by dying. When cells in a certain location die and are disintegrated it is claimed by Ross that these products stimulate the surrounding cells to multiplication also increases resistance or overcomes whatever may be producing the condition. We usually think of the products, for instance of pus, as being destructive to the body. They are destructive metabolic products and represent leucomaines and perhaps a variety of other things, and, so far as I understand the situation, there are formed no anti-bodies that antagonize such products as leucomaines or ptomaines. The bodies that are formed are opsonins or are of an antitoxic or bactericidal nature, but these are not antagonistic to leucomaines or allied compounds.

The doctor speaks of the products being beneficial in the cure of diseases, and at about the same time condemns the various bacterins or vaccines. I do not know that he included vaccines in general. It seems to me we have a wider range than simply the cure of disease, and I believe it has been conclusively shown that many of those other products which the doctor condemned produce immunity and protect animals against disease.

Dr. Duncan: It seems the best way to determine whether this is homeopathy or not is to ask the homeopathic physician themselves. I recently had occasion to obtain an expression of opinion of the physician occupying the chair of homeopathic philosophy of the New York Homeopathic Medical College. He said—"Homeopathy is separated from this treatment by all the breadth and depth of the great gulf that separates man from the beast." But let us assume for the sake of discussion it is founded on the homeopathic principal of cure. Then the spontaneous cure of diseases is founded on the homeopathic principal of cure. The similarity of this method of cure to Wright's method of cure is apparent, so then Wright's opsonic therapy is founded on the homeopathic principal of cure as are all the cures made by other vaccines. The chief aim of the veterinary physicians is to cure his patients he cares not what the medication may be if it will cure that is enough for him, and it should be enough for any physician. The technic for each disease will have to be worked out, for the technic of the application of all diseases is not alike.

For example in sepsis it is especially applicable in the first and last stages of the diseases although it tends to be curative in all stages, it is especially curative in gonorrhea that has not progressed further than four or five days of the discharge, in bronchitis it is especially curative as far as I know in all stages, in pulmonary tuberculosis all stages but especially in the incipient cases, in pneumonia within the first three days after the initial chill, etc., etc.

Try it, work out the application for animals, you have here a new weapon of combatting many of the very worst forms of diseases with which you come in contact.

STANDARD, PURE AND POTENT BIOLOGIC PRODUCTS.

By C. A. Cary,

Auburn, Alabama.

The multiplicity of biologic products that may be found on the market causes the public to open its mouth, buy, devour, suffer, get relief, or get no action, paying the price regardless of results. Even the general medical profession becomes now and then disgruntled, if not disgusted, with the great list of semi-potent biologic products that smack of sweet and easy quackery. All that is required is a little pressure of the hypodermic syringe and the mysterious biologic product will do the rest. But why this variety of products that are said to be the same? The differences or variations in purity and potency are due to the care, the honesty, the ability and the facilities of the maker of biologic products.

For instance take the history of tuberculin, and its record of twenty-two years, which has been a veriable and checkered one because of its commercial value, and variety of makers. Some of the erroneous records made by using it as a diagnostic agent, not to say anything about its use as a curative agent, have been due to impotent tuberculin that was forced on the market before it was standardized or tested.

Again, anthrax vaccines. Doubtless the indiscriminate sale of anthrax vaccines to the laymen and possibly to professional men has been the means of disseminating anthrax especially where the germs were not properly attentuated. In all cases where such vaccines as anthrax are to be used, there should be no possible doubt about the strength of degree of attenuation, and they should not be placed in the hands of the inexperienced and technically ignorant. In fact, the use of anthrax vaccines should never be permitted until a positive biologic diagnosis has been made by an expert. The Alabama live stock sanitary board has a regulation demanding that a positive diagnosis of anthrax be made by some recognized state authority or by the bureau of animal industry before anthrax vaccine can be used even by the professional.

The well known outbreak of foot-and-mouth disease is said to have been brought about by the mistaken use of contaminated and infected smallpox virus that was used by a commercial biologic house.

If accurate records could be secured it would be very interesting, if not astonishing, to find how many failures, mistakes, actual serious infectious and impotent results have obtained from the indiscriminate manufacture, sale and use of nearly all biologic products. Why should such a hazardous and heterogenous state of most important affairs be left to the variables and unknown quantities in commercialism when there are ways and means by which the medical profession and the public may be protected without unduly restricting commercial trade?

The best way out of this perplexing difficulty is to place the manufacture and the sale of all biologic products exclusively in the hands of the government. Public good, public welfare and public health demand it. Some assert that such a procedure would lead to paternalism. But the results to be obtained are solely for the good, the welfare and the protection of the public, and consequently the end justifies the means. Moreover the means or method is also correct and right in every way. The law regulates quarantine, the manufacture and sale of poisons and such drugs as cocain, morphin, opium, strychnin and arsenic, why not biologic products that are used in the treatment and protection of animals? There are many good reasons why the government should manufacture and regulate the sale of all biologic products. The government can secure the best experts whose salaries need not depend upon commercialism. Here someone may claim that politics would influence the work of the expert. The same can be said of the commercial manufacturers of biologic products. They have been known to play political hands. Moreover, the biologic workers at Washington have had almost an unlimited tenure of office. Again governmental authorities can secure the best materials and facilities and can thus as near as possible make a constantly standard biologic product.

Another plan would be to have the government and the various states make the biologic products. In some things like hog cholera serum this plan might work equally as well and in some ways better than to have the government make all the serum. Yet it might mean as many kinds of serum in purity and potency as there

are states. However, there can be coöperation of states and then the standard could be uniform.

Still another way of controlling the output of biologic products. It is the one now in force regulating the manufacture of biologic products used for the human family. The manufactures obtain a license from a government department and this department periodically tests the products of licensed houses and thus force them to make standard biologic products. This method has greatly improved the products used in human medicine. Yet there are loop holes and defects; the government department tests only a few of the products made by the private or commercial house whereas if the government or state were making it, every "batch" or combination of "batches" would be tested.

In January, 1912, the Alabama live stock sanitary board at the writer's request promulgated a regulation which required the manufacturers of the biologic products to be sold in Alabama to obtain the endorsement of the bureau of animal industry. Some of the bureau of animal industry men looked upon this favorably, but the secretary of agriculture said that there was no federal law and no money to enforce control over the making of biologic products. Dr. Melvin wrote me that there was an attempt being made to have a law passed giving the bureau of animal industry a "license" control over the making of veterinary biologic products. It is to be hoped that it or some better federal law will be passed and put into effect at an early date.

I do not wish to imply or to assert that much good has not been done by the manufacturers of biologic products. In fact, they have done a great deal that could not have been accomplished without their work, but some of them, in fact nearly all of them have pushed the commercial idea to such an extent that they are advertising and selling products in a way that is not commendable, not to say anything about the medical or scientific aspect of the work. In fact if the best houses now in existence would eliminate the semi-patent medicine advertisements and the "quack" testimonials and then standardize their products according to some fixed government standard they would certainly improve and be second only to the actual government manufacture of the products.

DISCUSSION.

Dr. Fitzgerald: The paper as it has been read certainly deals with actual facts in a short, concise manner and covers the ground thoroughly.

I think all of these preparations should come under federal jurisdiction. My attention was recently called to an instance where a veterinarian was asked to test some horses, that were to be shipped to another state and had to go with a certificate from a reputable veterinarian. The doctor went to the bureau of animal industry for mallein, but, owing to a recent demand, they were unable to give it to him and he was obliged to search the town in order to get enough mallein to test the horses. Every animal reacted with the preparation he was able to secure. As the horses were very valuable, blood tests were made and all were negative. The ophthalmic test was tried and it, likewise, proved negative. Naturally conditions were confusing and it is only another case to show the necessity for standardization for in this instance it was a question whether the preparation was a standardized biologic product.

The owner of the horses in the above instance was put to a great deal of inconvenience, expense and there was absolutely no protection for the veterinarian who was very naturally placed in a rather embarrassing position. Similar cases occur with tuberculin and in many states anybody with a hypodermic syringe has been permitted to go out and test cattle, resulting in the unnecessary destruction of many cattle.

Dr. Rogers: I would like to say a word from the standpoint of the manufacturer. I am thoroughly convinced that they take every precaution to bring their line of biologic products to the highest degree of efficiency, and though there appears to be an opinion current among some people that good work cannot be done in a laboratory where the products are sold commercially, I believe the commercial manufacturers of biologic products make as good products as do sanitary boards.

I believe all the great manufacturers of biologic products would welcome the stiffest kind of control and, personally, I would like to see a condition where no such product is recognized unless passed upon, at the expense of the manufacturer, by a committee or council of the American Veterinary Medical Association. Moreover, I believe a number of manufacturing houses of biologic products are exerting every effort to standardize their products and bring them to the highest degree of efficiency, and some of them, at least, are equipped to do work that is not within the province of a small state laboratory. I am sure I voice the sentiment of a great many when I say the great biologic houses would welcome the strongest and most stringent kind of control of their products.

Dr. Cary: I wish to say that the larger houses all favor some kind of control. Although some do not say out and out that the government should control, most of them favor such a system and they are not opposing the standardization of products.

Dr. Leech: I do not care to continue this discussion very long, but desire to bring out one thought. Dr. Cary suggested that it would be a good plan to have this matter in the hands of a bureau and I agree with him as it would tend to prevent the use by veterinarians and others of products detrimental not only of the profession at large, but also, to the farmers. Many veterinarians are not in touch with association meetings but most of them read the veterinary journals and would profit thereby. I live in a country where one of the greatest manufacturing concerns has

a strong influence, and a great sale of a product upon which the government has absolutely put its seal of disapproval, saying the product is not good, not serum, and without potency; a product used extensively by some practitioners, and accepted by the farmers as good.

Dr. Roberts: There is a paper in the section of practice today showing that there is an absolute demand for a plan of this kind. I believe it would be wise for this Association to create a committee of three or five who would be in control of these products; to whom all formulas, or all such products would be submitted for their approval. Then the veterinary magazines would publish the fact of such approval that people would know approved products were of the proper standard. That would seem to be one way out of the difficulty.

Dr. Rogers: It has lately been my lot to receive a number of communications from editors of agricultural journals making inquiry relative to the value of certain medical and biologic preparations offered them as advertisements. These publishers showed a decided desire to protect their subscribers and though they want to clean up do not know how. We went so far in a number of cases as to make gratuitous analyses of a number of products submitted. It is certainly to the interest of the agriculturist, the veterinary profession and to the manufacturing houses who are trying to do the square thing that some kind of control should be exercised over these products.

Recently the editor of the Country Gentleman which, by the way, is a pretty clean paper, told us they could not accept a certain advertisement of hog cholera serum because it conflicted with their policy in regard to advertising anything that spoke of a cure. He said he realized that in carrying out that policy in preparations of that character he was leaning over backward but he saw no other way out of the difficulty. I suggested to him that possibly products of that character could be passed on by a committee of this Association, at the expense of the producer, and he remarked that he would be happy under such circumstances to accept that sort of advertising as it would be a benefit to his subscribers. I really believe the time has come when something along that line ought to be done.

Dr. Cary: The difficulty about the American Veterinary Medical Association doing this sort of thing is that we would have to maintain laboratories and I do not know that we are prepared to do so. The only reasonable way I see is for the government to take up the subject in the same way the serum products for administration to the human family are standardized and controlled by a license system under the United States department of public health.

SOME IMPORTANT FACTORS IN THE CONTROL OF COMMUNICABLE DISEASES.

By Veranus A. Moore,

Ithaca, New York.

At the request of the chairman (of the section on sanitary science) I promised in an unguarded moment to discuss some of the underlying factors in the control of communicable diseases. Upon reflection it seemed presumptuous on my part to bring before this body a paper on such a general and well-known topic. I am aware, however, that with all our knowledge we, as guardians of the health of the live stock of the country, are too often obliged to witness the havoc of epizootic and communicable diseases that the judgment of the layman leads him to believe we should have prevented. Many of you hold official positions and others are advisors to executive officers who are not trained in the nature of diseases but nevertheless are charged with the responsibility of their control and consequently veterinarians are largely responsible for the wise and for the foolish statutes, rules and regulations for controlling this class of maladies. This is a responsibility we are loth many times to assume but in a profession like ours we must be prepared to respond to all calls and to accept the consequences.

It is not my purpose to dwell at length upon the well-known facts relative to epizoology, but as a basis for discussion it is necessary to mention briefly a few of the essential ones as they are now understood regarding the nature of infectious diseases. The discovery of a specific etiology for the epizootic and other infectious diseases has given to each a definite place in the organic world. They exist as do weeds; they spread after their own method or methods; they thrive where their environment is suitable; they disappear when conditions are sufficiently unfavorable. As each of these affections has its specific cause the life history of this etiologic factor gives all the information necessary to ascertain where in its cycle it can be most readily intercepted. This infers that we know the cause of all of these maladies. While this is not true in case of several of them the means

by which their virus is disseminated is, with few exceptions, known. When approached as a biologic problem, which it is, the control of infectious diseases resolves itself into the acquisition and application of certain definite knowledge concerning them. The most essential is to know the cause; the channel through which it escapes from the infected body; its fate after leaving the body of its host; and the avenues through which it gains entrance to the uninfected. This cycle, which is as old as dumb creation, was a veritable mystery until the researches of the pioneers in microbiology pointed the way to its revelation to man.

The question that is uppermost in this discussion is: are we as a profession doing all that it is in our power to do to reduce the losses from infection? Have we learned as we should the lessons of preventive medicine and what they mean directly to the live stock interests of the country and indirectly to ourselves? The history of epizootics in this country shows that with several maladies the veterinary service has been efficient while with others its progress has been lamentably slow.

A little study will point out that the diseases which have been controlled in a masterly way—more so I think in our country than in any other—are contagious pleuro-pneumonia of cattle and foot-and-mouth disease. An inquiry into the nature of these maladies shows that they are both highly infectious and that a large percentage of the animals exposed actually become infected. Again, they are not indigenous and must be introduced. When that has happened our officials have taken them in hand and by the heroic measures of quarantine, slaughter and indemnity have banished them from the country.

There are, however, other diseases such as anthrax, tuberculosis, glanders, rabies, infectious abortion, hog cholera, and many more that seem to have been introduced and to have become well established and quite widely distributed within our borders. Many if not all of these appeared before there was sufficient knowledge of their nature to apply methods for their prevention, much less for their eradication. These have continued to spread after their own means of dissemination, often aided by the habits of animal owners, until they stand out conspicuously as a menace to the live stock industry and in some instances to man himself. In that role they present themselves to the veterinary service of the country and defiantly say: "Stop us if you can."

The problem in conquering such enemies is centered in the

acquisition and application of knowledge whereby their dissemination may be checked. Why for example have tuberculosis, glanders and rabies spread in our very midst? Is it because of lack of knowledge concerning the mode of infection or is it due to other causes such for instance as bad legislation that we could not or at least did not prevent?

It has often happened that people have looked for legislation or other official ordinances to check the spread of epizootics. Veterinarians have not infrequently made strenuous efforts to secure official aid to stop an epizootic where an early diagnosis and the application of the present knowledge of preventive medicine would have saved the loss. We may look to legislation for assistance but as in a great conflagration a pail of water in the beginning will do more effective service than all the fire departments later on.

It cannot be denied that a thorough knowledge of the nature of epizootic diseases and of methods for making an early diagnosis are the most necessary elements in the control of such infections. Knowledge, however, is more easily discussed than acquired. There is a tendency now and always has been to overestimate the accomplishments possible with a little knowledge. Nowhere has this tendency been greater than in case of disease. The consequence has been that altogether too much reliance has been placed upon isolated facts and often far reaching conclusions have been drawn from them. These isolated facts constitute mere fragments of knowledge and are not in themselves sufficient to bring about the desired end. It is essential to know the cause of a malady but we have had that knowledge concerning the more serious of the common diseases of animals such as tuberculosis and glanders for thirty years and yet the discussion of methods for their control is as active and as controversial as heretofore. The fact that tuberculin gave a reaction in a large percentage of cases of tuberculosis was interpreted to mean that it would cause a reaction in all cases where infection existed, a conclusion long since found to be erroneous. It was long supposed and by many is still believed that after an animal had recovered from an infectious disease it was safe for it to mingle with others. Because of this supposition, and because an infectious disease may exist in such a light form as to escape recognition, fowls, swine, cattle and horses apparently have not infrequently been bought to the sorrow of the purchaser who by so

doing has suffered heavy losses from disease unconsciously introduced. Again we have failed in formulating methods of control to discriminate between the highly infectious and rapidly developing diseases and those of a chronic nature, slow in development and widespread in their distribution. Thus a study of what has been attained, as well as the problems still before us along the line of control, suggest that as yet we see only in part.

The first and most important factor in the control of infectious diseases seems to be knowledge of their cause and the means for making an early diagnosis. Coupled with this must be a knowledge of when in the course of the disease the virus is eliminated from the infected. This is not so significant with the highly infectious maladies where heroic measures are applied, but with such diseases as glanders and tuberculosis it is very important. All cattle that reacted to tuberculin were at first considered immediately dangerous, but the researches of recent years indicate that it is not until the disease process attains to a certain stage that the specific bacteria are given off and the animal becomes a menace to others. This fact is the crux of the German method for controlling tuberculosis. It may not be enough in itself but it takes us one step nearer the goal.

The dissemination of viruses through secretions that may contain them is an important factor that has been neglected in many if not most localities. In this country tuberculosis has probably been disseminated through the separated milk and whey from creameries and cheese factories receiving the milk from infected dairies quite as much as by any other means. Russell of Wisconsin has demonstrated the efficiency of these unsterilized by-products in spreading tuberculosis. In Denmark the separated milk is pasteurized before it is returned to the farm. Other infections such as foot-and-mouth disease are transmitted through the milk. Efforts to prevent diseases of a chronic nature have placed too much emphasis upon the infected animal itself and all too little upon the control of the secretions that are widely distributed or utilized and which are often the agents for the distribution of the virus.

Recent investigations tend to the conclusion that the communicability of the more common infectious diseases with which we have to deal is restricted to individual contact or contact with recently given off secretions, excreta or discharges containing the virus. This tendency adds to the importance of a more careful

study of "carriers" among the lower animals. The significance of chronic cases has long been recognized, but the importance of virus disseminators among animals that have recovered has not been sufficiently emphasized. Specific illustrations of this means of spreading the virus and starting up new outbreaks are not numerous where the proof is sufficient to verify the statement. I have in my personal experience however observed fowls that had suffered from "roup" or diphtheria and which seemed to be fully recovered sold and placed in a flock of hens where roup had never been known and where within a short time nearly every fowl in the flock was suffering from an acute attack of the disease. In the last outbreak of foot-and-mouth disease in this country, a calf that had recovered carried the infection to an entire herd. These facts are very suggestive and they bring very vital topics for the sanitarian and those who have to advise the buyers of animals. The teaching from the interesting discoveries relative to typhoid and diphtheria "carriers" in the human species are no doubt applicable to several diseases of the lower animals.

With certain maladies, especially tuberculosis and glanders, the virus undoubtedly often gains entrance with the occult cases. It is well known that infected but apparently sound cattle and horses have often gone down with the disease after being brought into a new environment and that they have spread the death dealing virus to one or more individuals. This fact is not new and methods have been suggested to prevent it by way of applying certain tests such as tuberculin, mallein, agglutination or other specific reactions before accepting the animals. Experience, however, has shown that these tests are not always accurate because of the state of the disease at the time they are made. This causes us to look further and in our advisory capacity to suggest that animals must be bought so far as possible from sound herds and studs. Here again present knowledge does not always enable one to ascertain with absolute certainty whether or not the disease exists in any of the other animals. Because of the development of methods of precision there is a feeling that we must always be positive and that it is unprofessional to admit that we do not know. With material things this may be possible but with living creatures no man has yet fathomed all the mysteries regarding the subtle forces of resistance and susceptibility. The limitation of known tests compels one to look beyond them. Here the point is—Have the animals been exposed? To determine this requires

careful records of close observations and proper tests of a herd or stud. These should be so kept that the purchaser could determine from them whether or not he was justified in buying from this herd or stud. I have for several years advocated such examinations, tests and records as a means of guaranty by the owners of the animals. The chief objection that has been raised to such a procedure has been the lack of confidence in the knowledge or ability of the local veterinarian to do such work. When our practitioners become efficient in sanitary work their clients will, I am bold enough to predict, possess signed records of their animals that will warrant a buyer in taking or rejecting any individual.

I do not wish to belittle any of the methods of precision in diagnosing occult cases, but I am strongly of the opinion that the repeated application of such tests in isolated cases is not tending to the best results. These tests when properly made at the right time on all of the animals of the herd or stable are most valuable but the singling out of individuals at irregular times and often at short intervals and subjecting them to such an examination without considering the history or physical condition of the associated animals is not of so much assistance as many suppose. These infections are to be dealt with according to their various natures. The garden cannot be pronounced weed-free so long as it is not protected against seed-producing noxious plants that are thriving in the immediate vicinity. Likewise the individual animal that has been or is exposed cannot be pronounced free from infection. The dairy, the stud, the flock, are to be dealt with as units. It is in bringing about this condition that the veterinarian has a wonderful opportunity for service.

With certain maladies, there are at present no means of detecting infection in an individual until symptoms appear. Rabies may be cited as the best illustration of this class. Objectionable as it is to a community, quarantine is the sheet anchor of protection here. Although isolation and quarantine are the most effective measures for preventing the spread of this group of diseases, many communities seriously oppose them. Veterinarians and physicians have not always assisted in this important work as much as they should. In my own state the enforcement of quarantine has often been obstructed by professional men who with sophistry seek to expound the nature of the disease and to point out how unnecessary it is to quarantine. Again grievous

errors have been made by including too small a territory and in raising the quarantine too soon. The question here seems to be the education of the people in the nature of infections. There is still too much faith in the magic power of the "medicine man" and too much mystery about the disease. The factor here is education and the veterinarian is the teacher. The warning that was sounded by the great leaders, that man's opinion is of no value unless founded on the truth of the laws of nature should ever be heeded.

There is perhaps no other phase of this subject so open to controversy as that of immunization and vaccination. These have been advocated by various authorities for nearly all if not every infectious disease. Results, however, are conflicting, and with few exceptions methods of immunization have not been perfected to the extent that warrants their recommendation as a means of control. There has been such a rapid succession of immunizing procedures that it is impossible to predict the final results. Already the use of vaccines is complicating specific diagnostic tests; but after more research and experimentation definite knowledge on these points will be recorded and the true worth of the newer methods will be determined. One often feels in connection with the multiplication of these new and highly recommended procedures the truth of the lines of Schiller, "We must have foolishness even to exhaustion before we arrive at the beautiful goal of calm wisdom." While every encouragement should be given to the development of immunization as a means of preventing infection, it would seem to be a safer procedure, with the diseases for which it is possible, to center attention on the elimination of the virus. The feeling of safety that dominates one who has placed his confidence in immunization permits relaxation in reference to infection. If the method employed is not efficient it is worse than nothing. There is no half way position. The virus must be kept away or the animals must be immunized absolutely against it, if the desired protection is secured. Partial immunization or temporary resistance tends to modify not to prevent the disease.

The etiology of most infectious diseases with which we have to deal and the specific methods of making an early diagnosis are sufficiently well known to enable veterinarians to guard against the usual methods of dissemination. A great deal of excellent work is being done and never before did the outlook seem so

bright for complete mastery of these infections. The trouble lies in getting at the cases that escape or that are carriers of the virus and which start up the disease anew after it is thought that it has been eradicated. The essential factors here are the acquisition of further information concerning the period of incubation; the recognition of chronic cases; better methods for detecting arrested and occult ones and the detection and elimination of "carriers." To this must be added a greater appreciation of the definite time in the course of a disease when its virus is given off and its power of resistance outside of the body.

When the solution of these problems has passed into common knowledge the cord of restraint will have been so tightly drawn about the viruses of these maladies that their power of destruction will be known as a historical fact only. Then the enormous losses now sustained will have been saved and the suffering of dumb creation caused by these diseases and which it is our humane purpose to prevent will have ceased.

*INFECTIOUS ABORTION IN CATTLE.

By Ward Giltner,

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Abortion, or premature expulsion of the product of conception from the uterus in cattle, is a phenomenon that has been observed for many centuries. For perhaps a century, it has been thought by some that the cause of abortion, in its epizootic form, is an infectious agent. This idea of course must have been very vague in the early days before the relationship of bacteria to infectious diseases was definitely established. I will not attempt to review the literature at this time, since that has been done satisfactorily by McFadyean and Stockman[1] up to 1909 and recently by Surface[2] in connection with the diagnosis of the disease; suffice it to call attention to those researches that have a permanent place in marking progress in our knowledge of infectious abortion in cattle, and its etiologic organism.

In 1896, Bang[3] and Stribolt announced the discovery of their organism, which has since been called the Bang bacillus or *Bacterium abortus* (Bang). Their work was reviewed in English by Marshall[4] in 1899 but aside from this brief review little attention appears to have been paid to this vastly important work. Ten years after the publication of Bang's work, he reannounces his discoveries.[5] In 1902, Priesz[6] confirmed the findings of Bang both as regards the organism and its peculiar behavior toward intolerance of oxygen pressure. In 1908, Nowak[7] describes a method of cultivating the Bang organism in jars in the presence of cultures of bacillus subtilis, the purpose of the latter being to reduce the oxygen pressure. McFadyean and Stockman[1] reported in 1909 for the British board of agriculture and fisheries on this disease; they were able to find bacterium abortus (Bang) as the etiologic factor in infectious abortion in Great Britain. To them also must be given the credit for suggesting much of the diagnostic and immunization work that has followed, such as the complement fixation test, agglutination reaction and the use of "abortin."

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*Contributed to the report of Committee on Diseases.

Zwick[8] in 1910 was able to establish the identity of the disease in different European countries by a comparative study of the Bang organism.

MacNeal and Kerr[9] in 1910 published the first account of the isolation of this organism in America. They suggested the name *Bacillus* (or Bacterium) *abortus*. We would use the latter generic name in accordance with Migula's classification. We have studied MacNeal's culture and have compared it with the organism isolated by us in May, 1911, at the Michigan Agricultural College. We believe our organism is the Bang bacillus. We announced the finding of bacterium abortus in the report of the bacteriologist[10] for 1911, and in the 1911 report of the United States live stock sanitary association.[11] In this same report, we find the work of Good[12] which also establishes the existence of bacterium abortus in Kentucky. There is also in this report an announcement of the application of the complement fixation test in the diagnosis of abortion by Larson[13] and independently by Hadley[14] although this work seems to have been done in coöperation. Russell[15] calls attention to this work in October, 1911. Wall[16], however, in Denmark, and probably without knowledge of McFadyean and Stockmen's work had already in 1910 announced the value of the agglutination and complement fixation tests in abortion diagnosis. In this same year, Holth[17], also, calls attention to the application of the complement fixation test as a valuable diagnostic measure. During the present year, Larson[18] has given us another paper corroborating previous findings concerning the complement fixation test as a method of diagnosis. We wish to call attention to his error in attributing to McFadyean and Stockman the Nowak method of cultivating bacterium abortus in sealed jars in the presence of bacillus subtilis. It would seem proper to give McFadyean and Stockman credit for first suggesting the complement fixation and agglutination methods as diagnostic methods. There have also been published this year a bulletin by Hadley and Beach[19] along the line of the work previously announced by the former and by Larson, and an exceptionally well executed piece of work by Surface[2] on the complement fixation and agglutination tests. Attention should certainly be directed toward the circular[20] of the bureau of animal industry which announces the finding by Schroeder and Cotton[21] of an organism in milk that produces lesions in guinea pigs resembling tubercles, followed by the demonstration of Mohler[22] and Traum that this organism

is the abortion bacillus. Smith and Fabyan[23] focus attention on this feature in a very interesting article on the lesions produced in guinea pigs by bacterium abortus.

One cannot avoid the conclusion that progress is being made in the solution of the problems connected with infectious abortion. The literature has emphasized the causal organism and the serum tests for diagnosis. Little progress has been noted in the matter of immunization and handling of the affected animal. We wish to call your attention to the great importance of the handling of the cow that has developed that conspicuous "symptom" of the infection; we refer to the act of abortion itself which must be looked upon as only an incident in the course of the disease and not a necessary or constant feature. Our experience indicates that retention of the placenta is a very frequent sequel of abortion after the seventh month of pregnancy. Manual removal of the membranes is a procedure usually attended with difficulties and followed by a more or less severe purulent metritis. It can be stated with a degree of positiveness that disinfection of a mucous membrane, especially a parturient uterine membrane or one observed after an infectious abortion, is an impossible task; auto-purification may, usually does, take place after weeks or months. The efforts of the veterinarian should be directed toward assisting nature, not in placing greater burdens upon an already seriously affected tissue. Only the mildest antiseptic solutions can be used on the genital mucosae without producing untoward symptoms, as has been pointed out by Williams[24]. In the report of the bacteriologist of the Michigan agricultural experiment station for 1910[25], we reported on our success with a method designed to take the place of chemical or coal tar disinfectants in this connection. During three years, we have used this method and are firm in our faith in its efficacy. Briefly, the procedure consists in preparing sour whey by inoculating fresh separator milk with a pure culture of bacterium bulgaricum and after a firm curd has formed, straining through sterile cheese cloth. The whey thus secured has an acidity of about one per cent; it is injected into the uterus in quantities of about four ounces while the cervix is relaxed, after the closure of the os, it is introduced far forward into the vagina. A sterile rubber tube and funnel is well adapted for this purpose. The injections may be made daily or at such intervals as the state of the case appears to demand. We have treated a large number of animals

in this manner and have in no case failed to bring the arrival, in a short time, to an apparently normal condition. It is not unknown to find animals pass to a fatal issue as a result of the more drastic methods of vaginal injections of disinfectants and sterility not infrequently results from such non-fatal procedures. Our treatment can be recommended as absolutely safe, efficient and not attended by unfavorable sequelae.

The diagnosis of abortion may be discussed under the following headings: (1) Clinical diagnosis; (2) complement fixation test; (3) agglutination reaction; (4) the use of "abortin." As for the determination of the true character of the affection by clinical methods, we are unwilling to give any encouragement. Clinical methods have great value, but are far too indefinite, intangible and in too many actual cases absolutely unreliable. One should carefully read the description of cases by Bang[3] and by McFadyean and Stockman[1] to understand the clinical pathology of the disease. That the complement fixation test is of great value in the diagnosis of infectious abortion there can be no doubt. The recent work of Surface[2] demonstrates this point beyond the shadow of doubt; he introduces many changes of great value in the technic. To say that this test is infallible is going too far. So many factors enter into the actual technic that error is not easily avoided. The test is weakened by its very complicated nature and that it will become the universal method of determining the infection, can not be prophesied. Our experience in this connection does not encourage us in believing that it will.

The use of the agglutination test, like the preceding, is an adaptation of a well-known phenomenon to a new but analogous case. In favor of this test is its comparative simplicity. While it will always be a laboratory procedure, the factors involved are fewer and more easily controlled. Its interpretation requires none the less expert observation. McFadyean and Stockman[26] this year give encouraging report concerning the agglutination test. They state that one will be justified in regarding complete agglutination with a serum dilution of one to fifty or one to one hundred as strong evidence of infection. The blood serum of animals affected with contagious abortion may agglutinate abortion bacilli in dilutions of one to eight hundred. As a rule, normal serum agglutinates at a dilution of not more than one to ten. Brüll[27] states that sound

animals furnish a serum agglutinating at one to thirty-two, while habitual aborters furnish serum agglutinating at one to one hundred and twenty up to one to one thousand six hundred. The work of Surface[2] tends to substantiate these statements, but he believes that only agglutinations at a dilution of one to one hundred and above show positive evidence of infection. Those agglutinating at dilutions between one to twenty and one to one hundred may or may not be infected. Surface believes the complement fixation test to be the most reliable method and suggests checking up this test against the agglutination reaction and regarding only those that react to both tests as infected. Another important defect in these tests consists in their inability (as we understand them now) to differentiate between infection and immunity produced by the Bang bacillus. A pregnant cow may be infected and react and she may or may not abort. It is possible that a pregnant cow may react without being infected on account of the effect of a previous infection. A non-pregnant cow may react either on account of a present or previous infection. In brief, the conditions are so peculiar in this disease that a reaction leaves us in a most unsatisfactory and conflicting state of mind concerning its significance. Our work with these tests adds little to what we have reviewed above, and confirms our opinion based on a critical review of the literature.

Regarding the last mentioned test, we believe that something of great interest presents itself. McFadyean and Stockman[1] first made the material called "abortin" in much the same manner as tuberculin and mallein are made. They used a dose of about ten cubic centimeters and introduced it intravenously or subcutaneously. Alarming symptoms (possibly anaphylactic) followed its use by the former method in some cases, consequently prohibiting its use in this manner. By the subcutaneous method, a temperature reaction similar to that secured in the tuberculin reaction ensued in from two to six hours after the injection. The results are not clear cut in that all infected animals give a typical temperature reaction with all non-infected animals showing no temperature variation, but it certainly does give a reaction in many cases. Brüll[27] after continuing his work with this reagent reports unfavorably on its use. In the report of the bacteriologist for this year, we present the results of this test on thirty-three animals including a number of retests.

The "abortin" which we used was made by growing bacterium

abortus, isolated by ourselves and by MacNeal, in naturally sterile horse serum ten cubic centimeters plus glycerinated bouillon sixty cubic centimeters, for forty-nine days at thirty-seven degrees centigrade. Cloudiness was considerable and sediment abundant. The cultures, heated for thirty minutes in steam and filtered several times through filter paper, consequently contained many dead organisms. The material was preserved in five-tenths per cent phenol by addition of one part to nine of five per cent solution of phenol. It is not at all improbable that a more powerful reagent can be made capable of giving better results. We have grouped our animals under five headings: One, no reaction, no abortion; two, reaction, no abortion; three, aborted, no reaction; four, aborted, reacted; five, not pregnant, not reacting. Unfortunately, we were unable to check up our results by one or both of the serum tests. This is the line of work that should be pursued. The real value of all three tests may be determined in this way. No comment is necessary concerning our first group. They did not react and there is no clinical reason why they should have reacted. As for the second group (that reacted) we are under the necessity of explaining why they did not abort. It is as easy to explain it in this connection as it would be in connection with the serum tests where the same things happen. Abortion is a symptom of the disease—it may be present or absent. In these cases, it was absent. Let us call attention to the possibility of an immunizing affect due to the injection of "abortin," which may explain why our reactors did not abort. This is quite logical and if the suggestion has any weight, we have here an opening to a valuable field of bacterial therapeutics. Our next group shows those that aborted, yet gave no reaction. This should not happen if we expect the test to be valuable. We may here again explain away the weakness of the test. Three of these animals failed to react, although they had aborted and had reacted to a previous test made at a time nearer to the act of abortion. Possibly their failure to react to a second test is attributable to the effects of the previous injection of the reagent. This is the case in tuberculin testing many times. In another animal, the test was made over a month after the abortion occurred. Possibly, the effects of the infection did not remain long after the act of abortion, thus leaving the animal not in a condition (of anaphylaxis?) to respond to the reagent. For the remaining animal, no suggestion can be offered as to why there

was no reaction; however, it is well to bear in mind that in a herd affected with infectious abortion, accidental abortions may take place.

Concerning the fourth group (reactors that aborted) little need be said. These animals responded to the test as one would expect. Still, we are not satisfied with the degree of thermal reaction in all cases. Nothing need be said concerning the last group. In comparison with the work done by others on the serum tests, our results are not so disappointing. So far as our present knowledge is concerned, we are willing to admit that the "abortin" test as a reliable diagnostic agent in infectious abortion has narrow limitations. In favor of the "abortin" test is the possibility of its easy application by the practicing veterinarian who has no laboratory facilities or who has no special training in serum diagnosis. In order to make future serum tests of wide applicability, it would be well for veterinarians to learn to draw samples of blood from bovines. We have taken samples from the jugular, from the milk vein and from the ear veins.

We wish, finally, to consider in a brief manner the possibilities of bacterial immunization in this disease. Nothing is more remarkable in science than the fact that Ehrlich stands out as the leader in thought along two apparently unrelated lines of immunology and therapy in infectious diseases, viz., by anti-bacterial agencies having the specific organism of the disease as their basis and by chemical therapeutics related to the specific cause of the disease only in their apparently selective antagonistic action. Is there any hope of preventing or overcoming the infection by bacterium abortus by means of chemical agents? A well-known and highly recommended remedy widely advertised in the agricultural press has been found upon independent analyses by the United States department of agriculture[28] and the Michigan agricultural experiment station chemist to be composed of "approximately ninety-eight per cent of water, the remainder consisting of phenols (carbolic acid), oil of cloves, and a very small proportion of what appeared to be some form of vegetable matter." One is not entitled to condemn, a priori, the use of phenol in combating infectious abortion. There has been a feeling in the popular mind and amongst many veterinarians both in Europe and America that phenol injected subcutaneously or introduced with the feed has power to prevent an infected animal from aborting. For a long time, we recommended the use of and used personally on two

large herds two per cent phenol in subcutaneous injections and as large doses of five per cent phenol in the feed as we felt it would be safe to use[29]. There have been times when we were encouraged in the belief that this method was affective. But repeated failures when the conditions for the experiment were ideal have forced us to abandon hope of success from this line of treatment.

Nuesch[29] claims to have checked the disease by internal administration of one and three-fourths to two and five-eighths pints of one per cent aqueous solution of phenol daily in single dose. He treated both pregnant cows and those which had already aborted daily for from five to ten days and observed no unfavorable results. McFadyean and Stockman[1] place no confidence in the efficacy of this drug.

Bang[5] and McFadyean and Stockman[1] have opened up the field of bacterial therapeutics and immunity production in infectious abortion. Mohler[22] reports attempts along this line. One of the prominent biologic manufacturing houses in this country is or has been engaged in exploiting this idea perhaps prematurely. Piorkowski[30] did not succeed in procuring a serum but made a soluble toxin as an opsonic precursor from the bacilli by means of catalytic procedure. Veterinarians used it with good results. Hesse[31], using a bacterial extract, reports that in one case the dose of twenty cubic centimeters was apparently too large, for the animals showed tympanites but recovered in three days. No more abortions. In another case, ten cubic centimeters was injected first at the end of the second month of pregnancy, again at the fourth and lastly at the sixth month of pregnancy. No more abortions occurred.

We are now working upon the hypothesis that infectious abortion is a local uterine infection, so far as the cow is concerned, and that immunity will be phagocytic as in many other local infections. Theoretically, phagocytosis will be stimulated by raising the opsonic index and this should be accomplished by the injection of living or dead abortion bacteria. We attempted to immunize a virgin heifer with living cultures of the abortion bacteria. The injection subcutem of sixty-five cubic centimeters of culture produced a thermal reaction beginning on the following day and lasting about three days. The agglutinative power of the heifer's blood increased within one week from one to ten to one to two hundred and fifty as a result of the injection. A second similar injection after one week of one hundred and thirty cubic centi-

meters of culture produced a rise of temperature up to 105 degrees Fahrenheit and lasting for some time. This heifer, together with another untreated heifer was bred twelve days after the last inoculation. After about four and one-half months of pregnancy, both heifers were injected intravenously with ten cubic centimeters each of a typical culture of bacterium abortus incubated five days. Only a slight temperature reaction followed in each case. No other effects of the inoculation were observed. Three months and eight days later or at nearly the eighth month of pregnancy, each heifer was again inoculated with ten cubic centimeters of a similar culture intravenously and each received thirty cubic centimeters of the same culture into the vagina. No temperature reaction occurred. Each animal experienced a normal parturition. In this experiment, the desired result was not obtained. It is probable that the culture employed was lacking in active pathogenic properties, so that the effects of the inoculation were not apparent in either normal or treated animal. Such a culture may be highly desirable in immunity production. This is a point that it may take years to determine. Workers with tuberculosis have laid great stress on the particular strain of bacillus. Judging from descriptions of the cultures isolated by the different workers, we are led to believe that there is a great variation in cultures of the abortion germ of different origin.

In concluding our discussion of immunity production, we suggest that the following may be a practicable plan: Inject all non-pregnant females subcutaneously with the living culture, once, twice, or more times, using thirty cubic centimeters, more or less, of culture. Which particular strain to use must be determined in a way yet unknown to us. Theoretically, the last injection should be made a sufficiently long time before impregnation to give assurance that the germs of abortion have been eliminated from the system. All pregnant cows should be tested with "abortin," not so much for its diagnostic value as for its hypothetical therapeutic function. We can already foresee the difficulties arising in the employment of the serum tests when we begin our immunizing work. We assume (without proof of the facts) that all animals treated as we have indicated will react to these tests regardless of whether a satisfactory immunity has been produced. We are assuming that these injections are harmless, the assumption being based upon the observed fact that all the animals so treated by us have shown no signs of ill health although a number of them

are failing to conceive. May it not be possible that these injections will show a specific action toward the reproductive organs detrimental to their normal functions even as in natural infection we see a definite local specific action toward these organs in pregnancy?

To conclude this hetergeneous array of thoughts, we would call attention to the cultivation of the abortion germ in artificial media and laboratory animals. We have been able to produce abortion in guinea pigs and in rabbits but not in white rats and not uniformly in the two former animals. In attempting to immunize non-pregnant guinea pigs with living cultures injected subcutaneously and intraperitoneally, we have had unsatisfactory results and have observed, but not constantly, some of the phenomena pointed out by Smith[23] in this connection and by the workers in the bureau of animal industry[21].

In making a comparative test with media prepared from pregnant uterine wall, fetal membranes, fetus and amniotic fluid separately, we were able to use the last named only with marked success. Amniotic fluid sterilized with or without addition of agar or gelatine has proven the most successful medium yet tried. The field for experimentation in this disease is great and the workers are few but it is gratifying to see the vigor that has been instilled into the campaign from Minnesota, Wisconsin, Kentucky, Illinois, from the federal authorities and others in this country in addition to the work abroad.

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For Discussion see next paper.

RESULTS WITH THE COMPLEMENT FIXATION TEST IN THE DIAGNOSIS OF CONTAGIOUS ABORTION OF CATTLE.

By F. B. Hadley and B. A. Beach,

Madison, Wisconsin.

Since the perfection of the complement fixation test for the diagnosis of syphilis and glanders, many other diseases have been made the subject of investigation by using the blood serum as a basis. Among these perhaps none has a wider field of usefulness than the application of the test to the diagnosis of contagious or infectious abortion of cattle. This statement is made advisedly and with a full realization that exceptions may be taken. However, when the prevalence of the malady and the great number of animals that are subject to it are considered the above statement has more weight.

Contagious abortion is generally prevalent in all sections where dairying is engaged in, and has caused tremendous losses in certain pure bred herds in which conditions were favorable to the dissemination of the infection.

The disease is most frequently seen in the bovine species. It is caused by a specific microörganism which finds the pregnant uterus a particularly favorable location for growth; and is usually characterized by the expulsion of the fetus before the period of gestation has been completed.

The casual agent is known under various names. Of these *Bacillus abortus* (Bang) seems to be the most universally accepted. The organism is a cocco-bacillus 0.8 to 2 microns long by 0.5 to 0.7 wide, stains with aniline dyes, and is Gram negative.

In growing the abortion bacilli blood-serum-agar has been found eminently satisfactory for a nutrient medium. A rarefied atmosphere has given better results than ordinary incubator air. The colonies are small, round, slightly convex, and smooth, simulating a honey-or-dew-drop. A characteristic bluish cast is observed by transmitted light.

The pregnant uterus is a particularly favorable location for the growth of the abortion bacilli. When present in large numbers

they set up an inflammation which is perhaps most noticeable at the cotyledons. Finally the natural exchange of gases and nutrients between the mother and fetus can no longer take place with the result that abortion or premature expulsion of the fetus occurs.

It does not appear necessary to enter into an exhaustive discussion of contagious abortion from the clinical viewpoint, consequently many interesting points to the practitioner will needs be omitted. Of particular interest may be mentioned the belief that occasionally infected cows may act as carriers of the abortion bacilli for many months after the last abortion, as do the so-called typhoid fever carriers of the human race.

Our work with this diagnostic method as applied to the disease under consideration was started in June, 1911, since which time a large number of animals from different parts of the state of Wisconsin have been tested.

For a full description of the technique of manipulation and components used in the complement fixation test reference may be had to Research Bulletin No. 24 of the Agricultural experiment station of the University of Wisconsin by the writers.

The test is strictly a laboratory procedure and is based upon the presence of certain specific antibodies or immune bodies which circulate in the blood of infected animals. These substances vary in quantity and quality, depending upon the period of infection. Their presence is determined by using guinea pig complement, a constituent of fresh blood, as an indicator. If the blood-serum sample under test is from an animal harboring the abortion bacilli a fixation of the complement takes place, leading to a definite and easily recognized test tube reaction. On the other hand, if no infection is present in the animal whose serum is being tested the complement will remain free to act in the dissolution of the red blood corpuscles.

Because it is impracticable in a paper of this kind to take up the different steps in the performance of the test, it will be assumed that most of you are familiar with them. We will therefore immediately proceed to the interpretation of the reaction, which may be summarized as follows:

First. Cattle in which the serum shows a complete fixation of the complement in quantities of 0.01 cubic centimeters and 0.02 cubic centimeters are or have been infected with abortion bacilli.

Second. Cattle in which the serum gives a complete complement fixation in the quantity of 0.02 cubic centimeters and an in-

complete fixation in the 0.01 cubic centimeters amount also are or have been infected with the abortion bacilli.

Third. Cattle in the serum of which no binding is noted in the 0.01 cubic centimeter amount and an incomplete binding in the larger amount should be considered questionable reactors and retested after four or five weeks.

Fourth. Cattle in which the serum shows no power of fixing the complement in either amount should be considered free from the infection.

A positive reaction, obtained in testing the serum from a pregnant cow or heifer, does not necessarily mean that the animal will abort. We have shown that abortion is simply incidental to infection. All animals have a certain amount of non-specific physiologic resistance, while many members of infected herds show an acquired active immunity which they have gained either from an attack of the disease or by a casual vaccination.

It must be understood that there may be a considerable variation in sera from different sources. In some the antibodies are not present in sufficient quantity to bind the complement, indicating that the animal in question has become infected recently, or that she is just recovering from the infection. In such a case a retest must be made in four to six weeks to determine positively what condition actually exists.

In order that a comparison might be made between the agglutination and the complement fixation tests when used as diagnostic agents for contagious abortion, a series of parallel tests was carried out as per Table I, a glance at which reveals some discrepancy between the two methods of diagnosis.

TABLE I.

COMPARISON OF THE AGGLUTINATION AND COMPLEMENT FIXATION TESTS.

(— sign indicates negative reaction; + sign indicates positive reaction; ? signifies an atypical reaction.)

Number of Animal	Abortion Record	Agglutination Test	Complement Fixation Test
1	Never aborted	—	—
2	Never aborted	—	—
3	Never aborted	—	—
4	Never aborted	+	—
5	Never aborted	—	—
6	Never aborted	—	—
7	Never aborted	—	—
8	Never aborted	+	—
9	Never aborted	—	—
10	Never aborted	—	—
11	Never aborted	—	—
12	Never aborted	—	—
13	Never aborted	—	—
14	Never aborted	—	—
15	Never aborted	—	—
16	Never aborted	—	—
17	Never aborted	—	—
18	Never aborted	—	—
19	Never aborted	—	?
20	Never aborted	+	+
21	Never aborted	—	—
22	Never aborted	+	+
23	Never aborted	+	+
24	Never aborted	—	—
25	Undoubtedly infected	+	+
26	Aborted twin calves	—	—
27	Vaccinated heifer	+	+
28	Vaccinated heifer	+	+
29	Vaccinated heifer	+	+
30	Vaccinated heifer	+	?
31	Aborted 12-21-1911	+	+
32	Aborted 8-1-1911	+	+
33	Probably aborted 8-1911	?	+
34	Never aborted	+	+
35	Aborted 5-29-1911	+	+
36	Vaccinated heifer	+	+
37	Calf of No. 34	+	+
38	Aborted 2-19-1911	—	+
39	Bull	?	+

It is interesting to note No. 26, a young cow that aborted twin calves at the fifth month of gestation. Both tests gave negative results, indicating other cause than infection for the abortion; three months later another complement fixation test also resulted negatively. Nos. 28, 29, 30, and 36 are experimental heifers under process of immunization by vaccination with attenuated cultures of abortion bacilli. They all gave evidence of the presence of the organisms by the tests, although they had never been bred. No. 37 is the calf of No. 34; at the age of twenty-five days and again at three months its serum showed evidence of the presence of the specific immune bodies and agglutinins, a

point of especial importance when considering the matter of inherited immunity. The dam harbored the abortion bacilli at parturition, as we demonstrated by recovering the organisms from portions of the placental cotyledons. More conclusive evidence was established by preparing, from the growths, an antigen which gave a typical binding when titrated against the serum from a known positive reactor. The bull, No. 39, had been used for service in an infected herd for some time, which accounts for the positive results with his serum.

These and other comparative tests in which clinical history has been much more closely corroborated by the complement binding reaction than by the agglutination test lead us to regard the former as superior to the latter as a diagnostic means for contagious abortion. However, the additional evidence which the agglutination test brings to bear upon suspicious or atypical reactors is usually sufficient so that a definite diagnosis may be made. Accordingly, it is recommended in such cases for use in conjunction with the complement fixation method. When both tests give positive results we are safe in concluding that the animal is or has recently been infected. Other investigators report results which are in accord with the above statements.

Among other things it is, of course, of utmost importance to know if this new complement fixation test is accurate when applied to the same animal at stated intervals. To establish this point, consecutive tests were made on a herd of infected cattle belonging to the Wisconsin experiment station. The animals were of various ages and breeds and were representative of a good dairy herd. The results of these tests are given in Table II, and are interesting, as a number of hitherto undemonstrated and important points relative to this disease are brought out, viz:

First. The persistence of the immune bodies for more than a year after abortion occurred, e. g., No. 3.

Second. The fact that No. 5, a calf, did not show evidence of the immune bodies up to a year old, although she was dropped prematurely and was in constant association with infected animals.

Third. Evidence that these bodies appear gradually, indicating that a certain degree of immunity results from infection and that there is a decided probability of artificially increasing the immunity by the administration of vaccines and bacterins.

TABLE II.

SUMMARY OF CONSECUTIVE TESTS IN AN INFECTED HERD.

(— sign indicates negative reaction; + sign indicates positive reaction; ? denotes a typical reaction.)

No.	Abortion History	1911 July Test	1911 October Test	1911 December Test	1912 January Test	1912 March Test	1912 April Test	1912 July Test
1	Calved 4/29/'11	+	+	— — —	+	+	— — —	— — —
2	Aborted 8/1/'11	+	+	+	+	+	+	+
3	Aborted 2/19/'11	+	+	+	+	+	+	— — —
4	Aborted 5/29/'11	—	—	?	+	+	+	+
5*	Dropped 3/10/'11	—	—	—	—	?	—	+
6	Calved 2/19/'12	—	?	?	+	+	+	+
7	Aborted 12/21/'11	—	?	+	+	+	+	+
8	Probably aborted 8/11	+	+	+	+	+	+	— — —
9	Aborted years ago	+	—	+	+	— — —	— — —	— — —
10	Bull	— — —	—	—	+	+	— — —	+

*Injected with abortus vaccine in April, May and June, 1912.

The practical value of this new diagnostic method may be best brought out by giving a synopsis of the results obtained in the field. Samples of blood from various herds, whose owners wished to know definitely whether or not the contagious form of abortion existed, have been forwarded to our laboratory for examination. Sometimes full details concerning the history of each animal accompanied the samples. At other times absolutely no information was given. One veterinarian stated that he purposely omitted such assistance so as to avoid the possibility of influencing us by suggestions. When convenient, we have gone into the field ourselves to collect the serum samples, as by so doing we felt that more reliable data could be gathered. We realized that in new work of this nature too much care could not be observed if the results and conclusions were to be of scientific value.

TABLE III.

SUMMARY OF RESULTS WITH THE COMPLEMENT FIXATION TEST IN INFECTED HERDS.*

Abortion History	No. of Animals	Reaction					
		Positive	Negative	Atypical	Per Cent Positive	Per Cent Negative	Per Cent Atypical
No history of abortion....	350	69	267	14	19.7	76.3	4.0
Known aborters	118	99	17	2	83.9	14.4	1.7
Herd bulls	12	3	9	0	25.0	75.0	0.0
Totals	480	171	293	16	35.6	61.1	3.3

(*) A very few of these animals came from herds where no infection existed.

Of the four hundred and eighty animals represented in Table III, three hundred and fifty had no history of abortion, while one hundred and eighteen were known to have aborted, and the balance were herd bulls. Of the animals in these infected herds sixty-nine or nineteen and seven-tenths per cent showed evidence of abortion infection, although they had never aborted. Included in this number are certain cows whose history is unknown, and which undoubtedly had aborted some time in the past. But eighty-three and nine-tenths per cent of the cows which had been known to abort gave positive reactions. This apparent discrepancy is explained when attention is drawn to the fact that many of these animals aborted more than a year before the test was applied. It is assumed that the negative reactors in this group have lost whatever immunity they may have gained or their abortions were due to mechanical causes. The significance of the large number of negative reactions given by herd bulls should not be overlooked. Summarizing we find that out of the total four hundred and eighty animals tested one hundred and seventy-one or thirty-five and six-tenths per cent gave evidence of infection and two hundred and ninety-three or sixty-one and one-tenth per cent were free from it.

When it is understood that practically all the animals represented in the above figures came from infected herds the percentage is not larger than should reasonably be expected.

Experiments in attempting to eradicate contagious abortion from infected herds by using the complement fixation test as a means of detecting infected animals are well under way. Although not yet completed, the results so far obtained are very

encouraging and indicate that this may result in an effective means of controlling contagious abortion. In one herd where the positive and negative reactors were separated and placed in different quarters with special attendants, after a period of four months no abortions had occurred among the first group of cows while two premature births and four healthy calves had been dropped by the second group.

The question of immunity may be studied to the best advantage by the use of the complement binding reaction as a means of checking up results. Our attention was first directed toward the importance of this when large herds of cattle in which contagious abortion was known to exist were tested. It was observed that a number of animals which had never aborted gave positive reaction. Some of these undoubtedly had become infected quite recently and even aborted subsequently. Others, however, were actively immune to abortion infection, although they had never aborted.

We are not yet fully prepared to state how effective is the immunity possessed by cows which have never aborted but which give a positive reaction. Experiments now under way will materially assist in solving this very important and extremely practical problem.

This brings up the matter of actively immunizing cattle against contagious abortion by the administration of a vaccine or bacterin. So far, nothing at all reliable has been advanced as a treatment and the prospects of discovering a curative agent appear to be as remote as ever. Consequently, our aim must be to find an effective preventive. Vaccination may be the solution.

In conclusion, it may be said that the complement fixation as applied to contagious abortion is a delicate, specific reaction, which is as accurate as any biologic test. It provides a trusty means by which infected animals may be detected, afterward proper methods of segregation may be carried out and the disease brought under control.

The test does not distinguish between animals which are harboring the active organisms and those which are immune. Practically this makes but little difference, for the infectious and immune animals can be isolated together with impunity.

Before closing, we desire to acknowledge the assistance given in the technique of manipulation by Dr. W. P. Larson, formerly associated with us but now of the University of Minnesota.

Through the kindness of Dr. Holth of the Royal Veterinary Laboratory at Copenhagen, who was one of the original workers in this field, Dr. Larson became familiar with the test. Further, we are indebted to the owners of the various dairy herds whose hearty coöperation has made this work possible.

DISCUSSION.

THE CHAIRMAN: These papers are now open for discussion. Each person taking part in the discussion will be allowed ten minutes, after which the essayests will be given an opportunity to reply to questions.

DR. WILLIAMS: It was stated by one of the essayists that when the biologic test fails in cases of abortion, it indicates that the abortion has been accidental, or not infectious. I would like to ask the essayests if they know of a case that has been placed upon record where an animal has aborted, and post-mortem examination has revealed the fact that the exudate described by Bang, has not been present? In other words, I would like to ask them if they know of any record of accidental abortion in a cow which has been verified by a post-mortem examination?

There is another question which I think is very important, and that is regarding immunity. It has been stated in the papers by both essayists, I believe, at least by the first, that infection confers some degree of immunity. I would like to ask the gentlemen what evidences they have of immunity? The question of natural immunity as the consequence of experience has a very great bearing upon the possibility of artificial immunity through the medium of biologic products. I know it is generally said that we do meet with natural immunity from abortion in the cow. I have said so myself. I have said it because I have heard others say it. I believe, too, that that is the general view, that immunity does occur by experience. I have been very much interested in the question, and finally began to search for evidence of such immunity, and when I began to look up the subject could find nothing but general conclusions, so I turned to some original data, which I secured with considerable trouble, and was surprised to find that there is no immunity following abortion so far as the available data show. In one herd, for example, I have the data for ten years, and the average annual rate of abortion is fifteen per cent. The annual rate of abortion during the first pregnancy is thirty-eight; the annual rate during the second pregnancy is twelve, while that of the third, three per cent. When we came to analyze the data carefully we found that a cow which has passed safely through her first and second pregnancies is just as immune or more, as if she had aborted during the first and second pregnancies. The statement then that experience confers immunity is one which may be based upon an important truth. The truth is that most abortions in a herd occur during first and second pregnancies, and thereafter the animal possesses a certain immunity. But the fact that there has been abortion, or that the animal may have been infected with contagious abortion, so far as we know, does not count for much. In other words, abortion is con-

fined almost largely to first pregnancies and in those animals which had aborted during first or second pregnancies, there was a decidedly greater tendency shown to abort afterwards than with those which had not aborted during first and second pregnancies. In one case there was a premature birth in the first, an abortion in the second, the animal went farrow the next, aborted the next year, and the next gave a premature birth, had retained placenta and died.

Another point which has been brought out in regard to immunity from abortion, is the fact that heifers which abort during the first and second years are very largely discarded from the herd, and nobody knows whether they will abort again or not. Generally speaking, I will say that more than ten per cent of all heifers which abort during first pregnancy are sent to the shambles because of sterility, consequently, we do not find a very large percentage of abortions, because they are eliminated from the herd. It has not been because the pedigree of such heifers is not good, or because their natural powers are not good, but because a disease has set in which has destroyed their efficiency, and consequently they have been sacrificed. So, we do not know how great the degree of immunity is, but the data which I have analyzed very carefully shows that abortion is a great misfortune, and that there is a great loss to the live stock industry of the country through it. I have heard some people talk about the matter as though they thought it was a good thing for an animal to abort and be done with it, but that is not true. That is one of the greatest heresies with which we have to contend.

I would like to ask some of these gentlemen who have been working with the biologic test if they have found that in cases where the Bang organism occurs in the milk of the cow, she reacts to biologic tests?

Dr. Torrance: Mr. Chairman and Gentlemen, I recently had the opportunity of meeting Sir John McFadyean and Mr. Stockman, and had several conversations with them upon this subject of contagious abortion. I might say in passing, Mr. Chairman, that I consider work of this character of the highest importance to the veterinary profession. Any one who has practiced in America for any length of time is familiar with the fact that this malady is one of the greatest drawbacks to the live stock industry, because the losses that are due to the existence of this disease are tremendous. In fact, we may be face to face very shortly with the question of whether it is not necessary for the government of our two respective countries, Canada and the United States, to take some measure to prevent further dissemination of this contagious disease. Not long ago tuberculosis was allowed to be spread in every possible direction without let or hindrance. Recently it has been our experience that each of the states of the great American nation have taken more or less notice of the existence of this disease and are perfecting means to overcome it. It appears to me that the time has come when we may have to take notice of the existence of contagious abortion.

In dealing with the disease it will be necessary to have a body of men who are able to diagnose the disease without doubt. The clinical evidence

of this disease is, unfortunately, even to the average active practitioner an exceedingly difficult matter, so that we are thrown back upon laboratory methods for diagnosis. In discussing this matter with Sir John McFadyean and Mr. Stockman they told me, and they practically agreed that the results of their experience with compliment fixation were not sufficiently uniform for them to place much reliance upon it. They had tried the complement fixation test, and after giving it a fair trial had practically discarded it in favor of the agglutination test. The reasons assigned for this were that the complement fixation test is a highly complicated test, requiring so many different manipulations, that there is always present the possibility of some slight slip or error on the part of the manipulator. For that reason, among others, they favor the agglutination test.

There has sprung up in England, a practice among farmers of having the animals which they buy and which they propose to add to their herds submitted to the test for the purpose of ascertaining whether or not such animals are free from this infection. I found in my conversation with Sir John McFadyean, that this was getting to be quite general in England, and a large part of the work which they were doing was in testing animals in order to ascertain whether they were free from the infection or not, so that a buyer might be sure that he was not introducing disease into his herd; also, are they doing considerable work along the line of producing artificial immunity. In order to do this they injected into young heifers subcutaneously a large dose of active bacilli, two or three months before the animal was to be bred, and so far their experience with this method has been highly satisfactory, but the plan has not been on trial long enough for any large gathering of data on the subject, nevertheless, many dairy men who had suffered extremely from the ravages of this disease were applying to the department to have their heifers tested. Sir John McFadyean told me that he was convinced in his own mind (although he did not give me evidence of it) that an animal which was submitted to this artificial immunization or a cow which had gradually acquired immunity, was more valuable in the herd than one which had not been infected. This, however, is still, I think we must admit, a debatable question, and from the evidence recently submitted it seems to me that it is open to a great deal of argument. Dr. Williams brought out the fact that the percentage of abortion in heifers was very much greater than was the case in subsequent pregnancies, and this fact I think may be taken to indicate that a heifer which aborts the first time shows a better chance of coming to her full term at her next pregnancy, and we may assume from this fact that at each subsequent period there will be a lessening of the trouble.

Now, gentlemen, there is one thing upon which I would like to have a little information from this assembly, and that is to what extent this disease prevails in the United States. So far as my knowledge of Canada goes, I am convinced that the disease is quite widespread, especially among dairy herds. I do not think it is so extensive among

herds of range cattle. I would like to have some opinion as to the extent of this in the United States.

Dr. Taylor: Dr. Giltner referred to me very strongly in his paper. It had not been my intention to say anything with regard to my work because I do not feel at the present time that I am in a position to draw any very definite conclusions. My work is not as yet completed. Three years ago when I went to Montana I found the disease very prevalent in and around the City of Bozeman, but it was rather a new thing to me, to come up against cases of contagious abortion, especially in such quantities as I found there. I cast about for some means or measures of prevention, but found that most everything was rather unreliable so far as had been worked out up to that time. There had been previous records in the use of carbolic acid. I started in to use it. I had been using it nearly two years with results which were satisfactory to myself, when the report of the British Commission came out together with certain other data and information with which most of you are familiar. That altered my method of procedure somewhat, but inasmuch as I was satisfied that beneficial results occurred from my use of carbolic acid it set me to thinking as to what was the cause of that. Incidentally, in making my own investigations and in doing my work, I was making or securing some blood smears and counts. I saw that by injections of carbolic acid underneath the skin in the proportion of four per cent which I was using the results were pretty generally satisfactory. Of course, I ought to say in this connection that the work that I was doing was largely with range cattle, and many of you know that range cattle cannot be handled as you would dairy cattle. To disinfect the genitalia it necessitates roping and casting the animals and douching them by hand, of course, in large numbers a very arduous task, much more so than it would be with ordinary dairy animals. These investigations are steadily going on.

In the work that I did my results were very materially bettered by the injection of phenol (d) into the animal subcutaneously. Later on, I may have some more definite conclusions to report than at present, but just at this time, I am not in a position to state the definite results obtained. I have simply given an outline of the conditions with which I am surrounded and the substance of what has been accomplished.

A Member: I would like to ask Dr. Taylor what success he has had by the applications of a four per cent solution of carbolic acid?

Dr. Taylor: Well, of course, it is varied in different animals. I have been using right along ten cubic centimeters of a four per cent solution, hypodermatically.

Dr. Williams: Do you find any contamination of the carbolic acid in the milk?

Dr. Taylor: No sir.

The Chairman: Is there anyone else who has any question or any suggestion to offer? If not, I will call on Drs. Hadley and Giltner to answer such questions as have been propounded.

Dr. Hadley: I have been very much interested in what Dr. Williams, and Dr. Torrance have had to say. In answer to Dr. Williams' first

question I would say that so far as our work is concerned we have not carried on very extensive post-mortem examinations on cattle which have aborted and consequently cannot answer his question on that point, with any degree of accuracy. I think it is a very important part of the work and should be taken up by those who are able to follow it out. Undoubtedly a great deal of very useful information to the profession would come from more thorough investigations along this line.

Now in regard to immunity, there seems to be a general opinion that cattle acquire immunity through having been infected, but what evidence have we that the animals have a natural immunity against abortion? The evidence is rather conclusive in that we can demonstrate the existence of specific immunizing bodies in the serum, but I doubt if that is sufficient. It is certainly very interesting to hear the observations of Dr. Williams in regard to the so-called immunity, but I think that we shall find out that this question has been carried too far, and that some of these animals which we think are immune, are not so valuable as many people believe. I think that we have got to go further with these investigations before we can settle upon that as a fact. There seems to be no doubt from the evidence which Dr. Williams gives us that certain cattle may abort time after time. I know it has been stated a good many times through the agricultural press that a herd of animals which has aborted is more valuable than a herd of animals which has never been exposed to the disease, or one in which the disease has never appeared. With further study of this problem this matter of immunity, both acquired and congenital, should be definitely settled.

Dr. Giltner: Mr. Chairman, I want to take a little exception to what Dr. Hadley has just said about the presence of antibodies indicating immunity. That does not agree quite with my idea of it. I don't think that that is the way that Dr. Williams meant to be understood. Immunity as Dr. Williams used the word means, as I understand it, resistence to disease. The presence of agglutinin, or a response to complement fixation test, does not necessarily prove immunity. I would like to talk more on this proposition but it is hardly worth while at this late hour. It does not mean, I think, that an animal is immune in the sense in which Dr. Williams used the word. If it does, then I have had the misfortune to have been under a false impression along that line.

I would like to hear somebody reply to the question of Dr. Williams that is able to answer it fully. His question was whether anybody that had conducted a post-mortem examination on a cow that had aborted found that the cow was not infected with the Bang organism.

Dr. Williams: Isolated from the exudate, or found in the milk.

Dr. Giltner: I have had a case of an abortion in a cow, where I removed the afterbirth, and I helped to remove the fetus and take the material to the laboratory. It was taken under the most careful precautions, and I know a remark was made to the herdsman in charge that there was certainly a case where all of the characteristics such as have been described by Mr. McFadyean and Mr. Stockman, were present. I had no doubt we could find the organisms there. No Bang organism was isolate. I am sure that every precaution was taken.

The work which is being done along this line, Mr. Chairman, is comparatively new. We are up against a real difficulty in protecting the live stock interests of the country from this trouble, and the great question is: What can we do to save these animals from the shambles? There are thousands of good dairy cows which are being sent to the shambles every year because of sterility. I believe it makes no difference from a clinical standpoint whether our animal becomes immune on account of age, or on account of the action of bacteria. The problem is whether to let the animal acquire immunity, or to protect it from the disease or infection altogether. What difference does it make to you so long as the animal lives, and is just as good when she drops her third calf as she would have been had she never aborted? Of course you have got to keep such an animal a little while longer, but I don't believe in killing off every cow that aborts as some veterinarians seem to do. I know a good many veterinarians who advise killing some of our best cows. I would like to cite just one instance which shows the danger of arriving at a conclusion too hastily: I know of a cow which had aborted two or three times. She refused to breed, although she came in heat for practically two years. They were on the point of sending the animal to the butcher, when I suggested using the lactic acid treatment to overcome sterility. I treated her three times at intervals of four or five days. In four or five days after the last treatment, she came in heat and was bred. Later she was bred again and was eventually slaughtered because she was believed to be open, and a four months' fetus was found inside of her. It indicated that the treatment had been efficacious and that the animal was not hopelessly sterile.

Dr. Salmon: Mr. Chairman, I would like to ask for a little information. I have been out of the country for some little time, and I have not kept as closely in touch with the developments of many of these matters as I wish I had. I have not been in active work, but I have been somewhat astonished today, to hear it stated that it is impossible for a veterinarian to remove the afterbirth. I did some work in contagious abortion some time before I went to Washington. I went there in 1883, so it was between 1880 and 1883 that this occurred. I remember in a large herd of Jersey cattle near Atlantic City, which was owned by a very intelligent man, a man of considerable wealth, an outbreak of contagious abortion cropped out and the owner consulted me about it. I looked into the matter and I said that I thought it was a contagious disease, and I started in to treat the cases by the removal of the afterbirth. I do not pretend to say that I took out all of it, but got out as much as possible, so that the discharge from the animal was slight and she soon returned to a normal condition. The best test of the efficiency of treatment is the success which attends it. There was about ten or fifteen cases of the trouble which occurred in that herd in the course of a couple of months. That was in a herd of one hundred cows. By removing this afterbirth and disinfecting the stables daily, we soon had the disease well in hand. I believe there were only two or three cases after that treatment was put into effect, and the herd remained free

from the trouble afterwards. I also remember several other cases where the same treatment was applied with good results. At any rate, my experience with the removal of the afterbirth and proper treatment of the other condition was such that I got good results, and became well satisfied in my own mind that it was the proper thing to do. Of course, there may be cases where a veterinarian could not do that.

I would like to ask Dr. Giltner, and that was the real point that I had in mind, why it is that there seems to be now such strong objections to that method of treatment?

Dr. Giltner: May I ask you what breed of cattle you treated?

Dr. Salmon: They were Jersey cattle. It seems to me very advisable to get rid of this afterbirth which is the center of the infection. From a clinical point of view, it seems to me very important that it should be removed and gotten rid of.

Dr. Giltner: I agree that the afterbirth should be removed, but I don't think it is *all* removed in any case, especially in large Holstein cattle. The trouble lies in careless removal and in improper attempts at disinfection.

*ANTHRAX VACCINE.

By Charles H. Higgins,

Ottawa, Canada.

The use of anthrax vaccine has been attended with varying results, some of which have been of a very unenviable character. Since the first demonstration by Pasteur, in 1881 and 1882, the vaccine prepared at the Pasteur Institute in Paris has given universal satisfaction and untoward results have been practically nil when their instructions have been followed to the letter.

My interest in anthrax vaccine has extended over a period of twelve years and at the outset was very discouraging. Using commercial vaccine Dr. Hargrave of Medicine Hat, Alberta, and myself had the misfortune to see five hundred sheep in a band of fifteen hundred fat wethers develop the disease and die after ordinary precautions had resulted in the checking of losses from the naturally contracted disease on an infected range. Subsequently, it was found that this vaccine was contaminated as well as being of too high a virulence.

Others here present have probably experienced some difficulty with this vaccine or have learned of serious losses directly attributable to the vaccine and it is my endeavor to throw some light on points relative to its preparation and use which will tend to reduce these undesirable factors to the minimum.

The original vaccine of Pasteur was put up in liquid form and if we can give credence to some of the traditions surrounding its preparation it was purposely contaminated with the Bacillus subtilis or the hay bacillus in order to disguise its true character and render futile attempts to cultivate it from the original. Both organisms being spore bearing, could live almost indefinitely side by side yet would puzzle the bacteriologist attempting to grow the vaccine, particularly at that time, owing to the fact that solid media were not then in general use. To Koch I believe belongs the credit of using a solid medium for the growth of this vaccine as originally prepared. He was also able to suggest that the

*Contributed to Report of Committee on Diseases.

bacillus subtilis was added in an endeavor to baffle the true nature of the virus.

There are various factors which may occasion untoward results when using a liquid anthrax vaccine. We may have a pure culture of too high a virulence;—the first vaccine may not offer protection sufficient for the second; there may be a contamination, or, the methods of administration may be faulty and introduce with the vaccine an infecting agent which so lowers the natural resistance of the animal that the vaccine increases in virulence at the site of inoculation, leading to an infection and a subsequent outbreak; the latter lies wholly within the province of the administrator of the vaccine and should be guarded against by him at the time of vaccination. The use of a culture having too high a virulence, or, a first vaccine which is greatly attentuated is controlled by the man who prepares the vaccine. He is responsible for such errors and should so arrange his system as to make them practically impossible.

There is an error for which he is not responsible, however, and this may occur at any time with the liquid vaccines as placed on the market. This is the settling of the bacilli to some dependent point in the tube owing to the fact that the anthrax spores are of a greater specific gravity than the liquid in which they are dispensed. I have had tubes in which the bacilli would settle to some point and it would be impossible to get them into suspension. This is particularly the case when sealed glass ampoules are used and the gravitation has taken place to the pointed end. In such cases, unless great care is taken, the potent portion of the vaccine is broken off with the end of the ampoule and your animal gets the culture fluid with little or no vaccine.

When the foregoing accident happens with the first vaccine it is easily seen that we have not introduced a sufficient amount to protect the animal against the second or stronger vaccine. If the first is properly administered and the accident happens with the second vaccine we have an incomplete protection and a false sense of security that our operations will be effective in protecting the animals concerned.

Another feature in connection with the liquid vaccine which concerns the laboratory worker only, is the difficulty in preparation and meeting emergencies when a large amount of vaccine is required. Where liquid vaccines are dispensed by the laboratory

it is necessary to have cultures of the first and second vaccines not over a week old. Older cultures may give satisfactory results but, with the danger of contamination existing and the possibility of varying factors or accidents increasing the virulence of the attenuation, there is a constant risk in such methods. Liquid vaccines cannot be tested except bacteriologically, for every disbursement, hence, there is this constant uncertainty. When cultures must be prepared every week the detail is usually delegated to some laboratory subordinate who should never be trusted with such work.

Having had experience with the various features connected with the use in the field of anthrax vaccine and later being charged with the responsibility of maintaining the potency of the anthrax vaccine disbursed by the Dominion government, I conducted various experiments to determine the possibility of using some method other than the liquid culture for the attentuated virus. The preliminary experiments which extended over a period of a year were successful and resulted in the use of a package previously designed for the disbursement of black-leg vaccine.

Properly attentuated organisms were dried on braided silk and experiments conducted to determine their protective power. For this work sheep were used. The sheep were tagged and the first vaccine administered. Twelve days were allowed to lapse between the administration of the first and the second vaccines and a further period of twelve days was allowed between the time of administration of the second vaccine and virulent anthrax. To a control sheep inoculation with a thread of virulent anthrax resulted in death within forty-eight hours while all vaccinated sheep remained healthy. In these experiments it was determined that the size of the dose of vaccine does not bear a direct relationship to protection. The administration of a single thread of each vaccine gave an efficient protection against a thread impregnated with virulent anthrax. Six threads of each also conferred an immunity, yet did not result in a severe systemic disturbance.

Anthrax vaccine has been disbursed by us on a dry silk cord for a period of five years and has been used on horses, cattle and sheep without the single report of an accident following its use. During the past year one of my assistants, Dr. Evans, had the opportunity to use this vaccine on some experimental sheep among which anthrax had appeared, with the result that two

hundred and forty-seven sheep weighing 23,927 pounds, immediately prior to the administration of the first vaccine and two days after the administration of the second vaccine 25,115 pounds. This gain in weight (2,673 pounds) was similar to that shown throughout the experiment for which they were being used.

There are many features in favor of the use of properly attenuated cultures dried on threads which do not hold for a vaccine disbursed in liquid form. Our experiments show that vaccine prepared in this manner is still potent after a period of six years. It may be prepared in large quantities by a properly qualified technical officer in amounts sufficient to meet all requirements.

The advantage to the user is, that he has a vaccine ready for use without the necessity for laborious shaking and he is certain that with the introduction of the thread beneath the skin the entire dose is given to the animal and no animal is given too large or too small a dose. Protection is thus assured against the administration of the second vaccine and with the administration of the second vaccine, protection afforded against virulent anthrax.

The laboratory worker can produce sufficient at one time to warrant elaborate testing out on sheep or cattle which would be impossible with a liquid vaccine fresh grown every week.

In closing my remarks on anthrax vaccine I may state that mention of killed cultures of the anthrax organism has been purposely omitted. I believe that if we are going to destroy the vitality of our cultures before vaccinating we might just as well use some innocuous germ which we know will afford protection against anthrax for a varying period. Other points of interest have not been dealt with as the time at my disposal is limited and published data is available for those who care to go more fully into the subject.

DISCUSSION.

DR. KEANE: I would like to ask the essayist a question in regard to the immunity produced in cattle. Does he have the same experience with cattle as he had with the bunch of sheep mentioned in his paper?

DR. HIGGINS: The same for all animals, horses, cattle and sheep.

DR. REICHEL: Dr. Higgins made several statements in his paper that are puzzling to me. He speaks of the dose to begin with and then of objections to the liquid form of vaccine. In the work of Dr. Webb, of Colorado Springs, he proved conclusively that a single bacillus of the proper virulence will kill a white mouse as quickly as a large number of

the same strain, and that a small number of bacilli of the proper strength would give as much immunity as a large number. I think Dr. Higgins added to that work when he said in the use of the cords he found that the dose really did not amount to very much. The secret of success in preparing anthrax vaccine is to have the proper strains to begin with. As you all know, strain number one will kill a white mouse but not a guinea pig and strain number two will kill a guinea pig but not a rabbit. We must encourage strain number one a long time by passing it through white mice repeatedly to have it kill a young guinea pig and then larger guinea pigs. I have found it is almost impossible to get strain number one to kill anything larger than a guinea pig. It was my good fortune to be able to follow up several years ago for the Pennsylvania state live stock sanitary board complaints that an anthrax vaccine was killing cattle. In one instance it was found that anthrax vaccine number one was used and number two given in ten days. The owner had the instructions from the state veterinarian not to turn the cattle out on an infected area for ten days after the last injection. Owing to a misunderstanding the owner turned the cattle out on the infected land within forty-eight hours after vaccination and several of them contracted anthrax and died. The strains secured from the affected cattle killed white mice, guinea pigs, rabbits and other animals.

The maximum effect of vaccination is obtained in about fifteen days, therefore, the animals ought not to be turned out on infected pastures for at least ten days after the second vaccination. I doubt the statement about reliable anthrax vaccine number one and number two causing infection in sheep or cattle. I should like to know if Dr. Higgins has been able to satisfy himself that properly attenuated cultures would increase quickly at the point of inoculation?

It is not a difficult thing to keep properly attenuated strains in the laboratory. We have had the same strains since nineteen hundred. We test these strains once or twice a year to make sure that number one would only kill white mice and number two would kill guinea pigs. When strains are used year after year in a laboratory the only trouble experienced is that they may lose some of their virulence and be too weak, but there is no danger of them acquiring a sudden virulence in or out of the animal body.

Dr. Kinsley: I have been very much interested in this paper, and particularly in the discussion. There is one thing that has appealed to me as a bacteriologic problem. Dr. Barber, who was until recently connected with the University of Kansas, invented a mechanism by which he could pick out a single bacterium, any one he wanted in the field. He found there was a great tendency, not only with the non-pathogenic but with the pathogenic organisms, to suddenly develop what he called a "sport." He investigated the colon bacillus and had at one time several subvarieties of this organism that he obtained from the development of sports. If morphologic variations occur, is it not possible that variation in pathogenesis may occur and non-pathogenic bacteria assume a pathogenic role or become pathogenic? That being the fact it is not difficult to conceive of bacterium anthracis, in the anthrax vaccine, becoming virulent rather

suddenly. If they change their morphology or change other peculiarities, is it not possible for them to change in their virulence from one generation to another? Dr. Barber was absolutely accurate in his experiments and his findings are no doubt equally applicable to pathogenesis.

If the quantity of vaccine is not material the cord vaccine is efficient; but if the number of microörganisms has to do with efficiency the cord vaccine is probably not as efficient as the liquid form because of the impossibility of having an equal number of bacteria suspended or deposited on successive stretches or measures of the cord. It appears as though the dose would be variable in cord vaccine.

Dr. Mayo: It seems to me there is another phase of the question that needs more investigation. I am convinced there are certain conditions, I do not say what they are—by which the natural power of immunity in an animal is lowered and that you can use a certain standard strain of vaccine upon a large number of animals, and then using that same vaccine on some other animals you will find, I believe, at times that some will succumb from infection from the vaccine, not due to a change in the vaccine, but to a weakened immunity in the individual. I think that in connection with the use of vaccines this is a subject that really needs investigation.

Dr. Reichel: In the work of vaccinating cattle against tuberculosis in Pennsylvania with human tubercle bacilli we found it necessary to keep animals away from all infection for six weeks after vaccination for if they were exposed within six weeks they were liable to contract the infection. If you keep an animal vaccinated for anthrax from infected land for ten days at least after the second vaccination it will have sufficient immunity to resist the infection.

Dr. Mayo: You did not infer I was arguing that the virulence did increase, but that some animals will succumb because of weakened immunity.

Dr. Reichel: Some animals have a low resistance. The low resistance of animals to infection enables them to pick up natural infection more quickly. That is the point I am trying to make clear for the reason that an injection of vaccine will lower the resistance for a short time and then strengthen it.

Dr. Dinwiddie: Unfortunately I was not in the room when the paper was read, but will take part in the discussion for I have had a great deal to do with anthrax. Some four or five years ago, during an epidemic of anthrax in Arkansas, vaccine was used from two different houses. Out of a very large number of cattle that were inoculated I never heard of one that died from the inoculation. We secured some vaccine and began to test it. I inoculated No. 2 into rabbits and guinea pigs but failed to produce infection in any case; it was ineffective and useless, it was dead. Another manufacturer had bacilli vaccine, dead bacilli. That interested me because I thought if we could get a dead bacilli vaccine the danger would be done away with. The information I got from the manufacturer was that he would be glad to have me test it and make a report on it. Not caring to do that kind of business I tried to buy the vaccine on the market but it suddenly went off and I could not get it. I would like to know whether there is anything in it or not. My opinion at the time was

that the vaccine made from dead anthrax bacilli was an experiment, or if not an experiment it was a fake.

DR. REICHEL: If you take the anthrax vaccine cultures that are kept in laboratories, and they are of proper strength to begin with, when the vaccine is prepared the tubes sealed they will not lose much of their virulence and can be isolated any time within six months. I hope to have data in a short time that will prove that they can be kept a year. Well kept strains of proper virulence used in preparing vaccine in the right way cannot be objected to.

DR. LEECH: There is one point raised I do not understand; the question of the right virulence and the proper strength prepared in the laboratory. I recently encountered a bunch that had been on an infected field, but with sufficient immunity so as not to cause loss. How do you determine the strength when you are up against an unknown condition?

DR. REICHEL: The strains that are usually used in the preparation of anthrax vaccine number 1 will kill white mice but not guinea pigs. Number 2 will kill guinea pigs but not rabbits. In some countries they use number 3, which will kill a rabbit but not a sheep.

DR. HIGGINS: The virulence of the strain is a factor and a man must have his proper attenuation at the start. If he has the proper attenuation at the start I believe he will have very little trouble. There is, however, the prevalence of the *"sport"* which Dr. Kinsley has pointed out. We have, as is well known, the *"sport"* in water supplies. That may be due to a factor over which we have no control. Hypochlorite will kill a certain number of bacteria in water, but it will leave a *"sport"* or *"husky"* which may subsequently revive and show its original virulence. My data was taken from the practice of the Pasteur Institute in Paris. They hold their cultures sealed for five or six months, but in making their vaccines they make a fresh vaccine every week.

The cord form we know will test out satisfactorily after six years. Dr. Hadwen worked with me some years ago and we found we could increase the virulence. We started with virulent anthrax, working at the outset with the strain we have bottled here today. You have the susceptibility of various animals to consider. In the outbreak I referred to, that Dr. Hargrave and myself dealt with in nineteen hundred and one, we had only sheep to deal with, although cattle were running about among the sheep. We had a few horses affected. There you have another question—susceptibility and immunity. I cannot explain it, I do not think anyone can.

An outbreak occurs at one time where horses may be affected and not cattle or sheep, and in another instance sheep will be affected and not the cattle or horses. In testing vaccine I prefer to use the larger animals, if that can be done, and that is why, to my mind, the cord vaccine is superior, because with it you can afford the price. With the liquid vaccine you cannot afford to spend forty or fifty dollars in experimental animals to test your vaccine.

The dead vaccine I only mentioned casually in my paper. I look upon dead vaccine as being a product unworthy of consideration by a trained bacteriologist. If he cannot produce a vaccine that can be used because

he is afraid of it before he sends it out he had better leave it alone. Since the Marine Hospital Service of the United States has taken over the standardization of the human biologic products a great advance has been made.

In the case Dr. Leech speaks of I would look upon the vaccine as being somewhat defective if after a complete cessation of the disease in the animals the vaccine started an outbreak. Dr. Hargrave and I, after we stopped an outbreak by the adoption of general sanitary measures started an outbreak on sheep that were on an infected area, by the use of vaccine. We found that defective vaccine was responsible for this.

BACILLARY WHITE DIARRHEA IN CHICKENS.

By F. S. Jones,

Ithaca, N. Y.

Perhaps there is not a more difficult problem before the breeders of stock today than that confronted by the poultrymen in successfully caring for chickens during the first ten weeks of their lives. Until four years ago the heavy mortality among young chickens had not been investigated scientifically. Poultrymen generally regarded this loss as a result of indirect causes, such as defective heating of the incubators and brooders and improper feeding. The rapid increase of these troubles brought about investigations to ascertain the cause and to formulate, if possible, preventive measures for their control. The disease or condition which seems to have given the most trouble is that popularly known as "white diarrhea." The results of the different investigations of these disorders reported have suggested different causes that should be considered.

Up to the present the term "white diarrhea" has been found to represent four infectious diseases, as well as other morbid conditions that may cause death or sickness with a diarrhea. The four distinct diseases now embraced in the term "white diarrhea" have been classified under the following heads, namely: (1) Coccidiosis, (2) Fatal septicemia or Bacillary white diarrhea, (3) Aspergillosis or Mycosis, and (4) Entero-hepatitis.

In February, 1908, Morse published a paper entitled "White Diarrhea in Chicks with Notes on the Coccidiosis of Birds." In this paper he claims that a great part of the so-called white diarrhea is due to coccidia, identifying the parasite as *Coccidium tenellum*. It was also stated in this paper that the same class of parasites causes losses to duck, turkey and pigeon breeders.

In July, 1908, Rettger and Harvey published a paper entitled "Fatal Septicemia in Young Chickens, or White Diarrhea," in which the authors stated that the cause of the disease with which they worked was a bacterium named by them *Bacterium pullorum*.

In August, 1908, Milks of the Louisiana experiment station

confirmed the results of Rettger and Harvey. He also described infectious entero-hepatitis, the cause of which he found to be *Ameoba melagrides,* the organism described by Smith as the cause of this disease in turkeys.

In October, 1909, Cushing described a fourth form of white diarrhea in the Canadian Poultry Review, under the title of *Aspergillosis.* Although this is not by any means the first description of aspergillosis in birds, it seems to be the first time the disease has been described as a large epizootic among young chickens in America.

Our attention was first called to bacillary white diarrhea in the spring of 1910 in an outbreak which occurred in central New York. Since then chicks sent to the laboratory for diagnosis have shown that the disease is prevalent in all parts of the state. Authentic outbreaks have occurred in the following states: Connecticut, Rhode Island, Massachusetts, New Jersey, Indiana, Kansas, Pennsylvania, and Maryland. From reports, material for diagnosis and queries received it seems safe to state that this disease is prevalent at least throughout the eastern part of the United States. There seems to be very little doubt that it will spread over a still larger territory.

The disease seemed to be an important one, and Rettger had already proved *"Bacterium-pullorum"* was the cause but in order to control the affection it was necessary to determine (1) the mode of infection, (2) the means by which the virus is spread. A careful study of the disease was made and a series of field experiments carried out.

Bacterium pullorum, the cause of bacillary white diarrhea, was discovered by Rettger in 1900. It is a slender rod-shaped organism, non-motile and grows well on most of the artificial media. It stains readily with all the ordinary bacterial stains.

The biology of the organism is as follows:

Morphology: Rod shaped, varying in size from two to three and five-tenths microns in length and having an average width of five-tenths of a micron. The ends are rounded. Although active Brownian movement is usually observed, flagella could not be demonstrated. Capsules or spores have not been found. Usually the organisms are grouped singly or in pairs. They stain readily with all of the ordinary bacterial stains. They are Gram negative.

Agar colonies: At the end of forty-eight hours the colonies have reached their maximum development. At that time they are round, having a diameter of one to two millimeters. The surface is convex and the edges are entire. Under the low power they have an appearance of being finely granular. The growth is much denser in the center, giving it the appearance of a nucleus.

Slant agar: Cultures on this medium made directly from an infected individual develop a characteristic growth. The colonies appear at the end of about twelve hours and continue to develop for forty-eight hours, when they appear as small fat droplets. They are round and rarely attain a greater diameter than one millimeter. They are raised above the surface of the medium. The surface is smooth, convex, glistening and of a grayish white color.

In the older cultures which have been transferred the growth resembles *bacillus typhosus* very closely. It is moderate and does not spread. It is glistening and translucent. The water of condensation becomes slightly cloudy and a heavy white sediment forms.

Gelatin: Growth is uniform, filiform and non-liquefying.

Potato: Does not grow on this medium.

Blood serum: The growth appears about the same as on agar.

Bouillon: Moderate clouding. Sediment is moderate and viscid on agitation. Reaction is acid.

Milk: Not coagulated and becomes very slightly acid in forty-eight hours.

Glucose bouillon: Forms gas and acid or acid and no gas. Twenty-seven (27) per cent of gas was produced, giving the following ratio: Hydrogen five: carbon dioxide one. Three and one-half per cent of acid was produced.

Lactose bouillon: Alkaline to litmus although when titrated five-tenths per cent of acid was found to have been produced.

Saccharose bouillon: The medium remains alkaline.

Mannite bouillon: Acid or acid and gas is found, sixty-five per cent of gas being formed having a ratio of hydrogen five : carbon dioxide two. Three and nine-tenths per cent of acid produced.

Glycerine bouillon: Alkaline.

Maltose bouillon: Alkaline.

The organism is easily killed by disinfectants, as the following table will show.

ACTION OF DISINFECTANTS.

Substance	Thirty Seconds	One Minute	Five Minutes	Ten Minutes	Fifteen Minutes
1-1000 corrosive sublimate	killed	killed	killed	killed	killed
1% carbolic acid.........	growth	growth	killed	killed	killed
1% creolin	growth	growth	killed	killed	killed
3 1-3% lactic acid........	growth	growth	killed	killed	killed
5% carbolic acid.........	killed	killed	killed	killed	killed

Boiling killed the organisms in one minute. Heating to sixty degrees centigrade for thirty minutes failed to kill them.

The organism is pathogenic to young chicks if inoculated orally within the first forty-eight hours after hatching. It is also pathogenic to chicks three days of age if injected subcutaneously. It causes death in from four days to three weeks and can be recovered from all organs. *Bacterium pullorum* is not usually pathogenic to old fowls. Recently a serious outbreak of an acute septicemia in adult fowls caused by *bacterium pullorum* has come to our notice.

Half-grown guinea pigs are susceptible when injected subcutaneously with the culture; and die in from twenty-four to forty-eight hours. The essential lesion is a large edematous area beneath the skin of the abdomen. The organisms can be recovered in pure culture from all the internal organs. A rabbit weighing one thousand six hundred grams was injected subcutaneously with three cubic centimeters of a forty-eight hour bouillon culture and seven days later died. The most pronounced lesions were enlargement, softening and congestion of the heart. The bacterium was recovered from all the internal organs in pure culture.

DESCRIPTION OF THE DISEASE.

The symptoms are not characteristic but are practically the same as in other chicken diseases. Usually the first symptom is the desire for more heat, the chick stays under the hover and close to the heating surfaces. This is followed by marked depression, loss of appetite, and labored breathing. The chick stands with its feet apart, eyes dull, head drawn down, and res-

piration is increased and labored. Diarrhea is usually present and in the cases of longer standing the feces gum up the feathers, often producing a mass as large as a walnut. This is what poultrymen call "pasting up behind." In the cases of longer stand-(1 to 3 weeks) emaciation becomes marked, the gait is uncertain, the legs seem to grow but the body remains practically the same size, causing the expression "short backed."

In those that recover development is arrested for a month or two but after that time the fowl develops rapidly and appears to be perfectly normal.

"POST-MORTEM LESIONS."

The gastro-intestinal tract is usually pale and contains a whitish shiny fluid.

The liver has a striped appearance, the background being a dull ochre color banded with stripes of bright red tissue, it is usually normal in size and very often is quite soft. The gall bladder in the acute cases is normal, but in the more chronic ones it is distended with dark colored bile.

The spleen is somewhat enlarged and a trifle soft, the capsule seems to separate from the pulp, and the organ usually assumes a slate gray color.

The heart is usually pale and the ventricles are filled with dark coagulated blood.

The kidneys are generally pale and very soft and the ureters are filled with white urates.

The lungs are usually very much congested.

The unabsorbed yolk is the most characteristic lesion of the disease. The yolk varies in size from a full undigested yolk to the size of a pin head. The consistency, like the size, varies with the course of the disease; in the early cases it is large and watery while in those of longer standing it is small and more gelatinous in character. In the more chronic form it is hard and cheesy and somewhat difficult to cut. The blood vessels surrounding the yolk are highly congested.

In a large number of cases the umbilicus does not seem to heal properly and a partially healed opening remains which usually emits a bad odor.

Experiments have shown that infection may take place in three ways, (1) through the egg, (2) by direct contact in the incubator

with individuals that have acquired the disease through egg infection, (3) by day old chicks being placed in contaminated surroundings. The manner in which the organism gains access to the egg is most interesting. Chicks may hatch from eggs containing *bacterium pullorum.* These transmit the virus to others. Of those infected, a number may recover. Some of these eliminate the organism but others retain it in the ovary and in turn transmit the virus through the egg.

The disease may in this way progress indefinitely and in time it would be impossible to rear chicks from such a flock. In one outbreak it was found that nearly fifty per cent of the breeding stock were spreading the virus through the egg.

Bacteriologically it is a simple matter to differentiate bacillary white diarrhea from the other chick diseases.

Bacterium pullorum may be cultivated on artificial media from the heart, liver, spleen, kidneys, lungs and unabsorbed yolk of chicks dying of the disease.

Clinically the differential diagnosis is not so simple a matter. Bacillary white diarrhea usually develops in chicks from the third to the fifth day and lasts for about one month. Entero-hepatitis and coccidiosis usually affect chicks after the tenth day. This disease usually runs a more chronic course. Aspergillosis presents severe symptoms involving principally the respiratory organs.

The morbid anatomy of the different diseases affords a good method of distinguishing between them. The gross pathology of these maladies may be given briefly as follows: (1) Bacillary white diarrhea: Heart, pale; liver, ochre in color banded with stripes of bright red; spleen, enlarged, pale and soft; intestines, pale, containing a slimy fluid. Unabsorbed yolk varies in size and consistency; blood vessels surrounding it are usually injected. Entero-hepatitis and coccidiosis resemble each other very closely. The mucosa of the ceca is ulcerated, the walls of these organs are usually thickened and congested. The liver is generally sprinkled with slightly sunken grayish white areas of necrosis varying in size and shape.

In aspergillosis the lesions are usually found in the lungs although occasionally the morbid processes may extend to the liver. The lesions consist in round grayish white necrotic nodules about the size of a small pea scattered throughout the lungs.

Recent experiments with an agglutination test similar to the one used in the diagnosis of glanders have shown that it may be profitably employed in detecting the adults that are spreading the virus through the egg. The usual dilutions of the blood serum that have been used are, one to twenty-five, one to fifty, one to one hundred, one to two hundred, although a number of positive cases agglutinate at a dilution of one to two thousand. At the present writing the blood serum of one normal fowl has agglutinated the organism at a dilution of one to fifty. All the higher dilutions were negative. The practicability of this test rests entirely on the value of the flock in which the disease exists.

Early in April, 1912, fifteen chicks all that remained from a hatch of five hundred were brought to the laboratory. A number of these were sick, and pure cultures of *bacterium pullorum* were recovered from those that died. The owner valued sixty-four of the parent birds at one thousand dollars. He was informed of the agglutination test and requested us to try it.

Blood from twenty-four hens agglutinated. Ten of these hens have been killed so far, and bacterium pullorum recovered from their ovaries. In outbreaks of this kind the test seems to be of extreme practicability.

PREVENTION.

Bacillary white diarrhea, like most of the infectious diseases can be prevented. The most important steps are (1) the removal of the adults that are spreading the virus, (2) the prevention of the spread of the virus from the infected chicks to the healthy ones As already stated, experiments have shown that the virus is transmitted in three ways: through the egg, by direct contact in the incubator with individuals that have acquired the disease through egg infection, by day old chicks being placed in contaminated surroundings.

It has previously been suggested that the greatest infection takes place within the incubator during and immediately after hatching. Although the probable number of eggs infected with *bacterium pullorum* is small, a chick hatched from an infected egg could infect a whole hatch. This may be guarded against by placing the eggs in a pedigree tray which consists of a metal box so constructed that it is divided into a large number of small compartments. Each compartment has a covering of wire, and not more than three eggs should be placed in a compartment. After

hatching the chicks should be left there until they are removed from the incubator, from which they can then be placed in a clean hover. Instead of placing the whole hatch of chicks together it would be better to divide the hover space by means of boards into as many pens as convenient. Not over ten chicks should be kept in a pen. It would be well to place the same chicks from the incubator compartment in the same pen. This segregation should be continued until the chicks have reached the age of four days for chicks are apparently immune to infection after they have reached that age. The boards can then be removed and the chicks permitted to run together. All chicks showing symptoms should be removed to a special pen. Those recovering from the disease should not be used for breeding purposes. The chicks that did not show symptoms of the disease can be used as breeders in the spring. It is recommended that the old fowls be marketed or kept separate from the young stock, as they may be spreading the infection.

Too much stress can not be placed on the thorough disinfection of the hovers and brooders and the burning of the used litter. For disinfecting purposes the following is recommended: one part crude carbolic acid, one part commercial sulphuric acid and twenty or thirty parts of water. The acids should be mixed in a wooden vessel and the water added slowly. The hovers, floors and runways should be thoroughly sprayed with this solution. Scalding of the feeding and drinking utensils is recommended. Another point to be borne in mind is the indiscriminate purchasing of eggs for hatching and of day old chicks. Several serious outbreaks of the disease have come to our notice caused by the hatching of eggs from infected sources.

Trap nesting and the pedigreeing of chicks will enable the poultryman to locate the parent birds that are spreading the disease.

TREATMENT.

It hardly seems of value to treat the young chicks because if they did recover a number of them would undoubtedly become spreaders of the virus. Kaupp has recently recommended sulphocarbolates combined with mercury to be placed in the drinking water. Personally I have used sulpho-carbolates and creosote and neither drug has given favorable results.

SUMMARY.

After careful study and experimentation extending over the summer months of 1910 and 1911 the following conclusions seem to be justifiable:

(1) *Bacterium pullorum* causes bacillary white diarrhea in young chickens.

(2) Infection takes place in three ways (a) through the egg, (b) by direct contact in the incubator with individuals that have acquired the disease through egg infection or by picking at the excreta or bits of shell that may contain the organisms, (c) by day old chicks being placed in contaminated surroundings.

(3) The disease travels in a cycle. Adult hens lay eggs containing *bacterium pullorum.* Some of these eggs hatch chicks infected with the virus. These infected chicks transmit the disease to others. A certain number of them may overcome the disease and grow to maturity. Of these certain individuals in recovering eliminate the organisms while others harbor the organisms in their ovaries and in turn become spreaders of the disease.

(4) Chicks are most susceptible to infection during the first twenty-four hours of life. They are less so when they have reached the age of forty-eight hours. They seem to be immune from infection after the fourth day of life.

(5) Male birds do not seem to become spreaders of the disease.

(6) Adult fowls may under certain conditions become infected with *bacterium pullorum* and die of an acute septicemia.

(7) The disease seems to be introduced into new districts by the indiscriminate buying of eggs for hatching and the purchase of day old chicks from infected poultry farms.

(8) The prevention of the disease seems to consist of the following: (a) removal of adults that are spreaders of the virus, (b) segregation of the chicks until they have reached the age of four days, (c) careful disinfection of the incubators, brooders, runways and feeding and drinking utensils.

(9) An agglutination test similar to the one used in the diagnosis of glanders could be employed in detecting fowls that are harborers of the virus.

ACKNOWLEDGMENTS.

The author wishes to thank Dr. V. A. Moore for his many helpful suggestions throughout the investigation.

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DISCUSSION.

DR. MOHLER: I have been very much interested in this valuable paper presented by Dr. Jones. There is no question from an economic standpoint that this disease is one of the most important affecting fowls. I would like to ask the essayist if he has tried the use of catechu as recommended for a treatment by the English?

DR. JONES—No, I have not. I have, however, tried lactic acid in the water.

DR. MOHLER: Together with other lines of treatment we are starting this catechu and methylene blue treatment recommended by English veterinarians but the results have not been all satisfactory.

DR. REICHEL: Is this disease epidemic in other animals?

DR. JONES: It is pathogenic for laboratory animals. Half grown guinea pigs when injected subcutaneously with the culture die within forty-eight hours; rabbits when injected subcutaneously with three cubic centimeters of a forty-eight hour bouillon culture died within seven days.

DR. MAYO:—How do you bleed your hens?

DR. JONES: That is a pretty stiff problem. Sometimes I cut off the back toe; other times I nick the comb using a sharp knife and holding the head down over the bottle. I usually take two or three tips of the comb.

DR. MAYO: It is very common among the Cubans to bleed chickens for various diseases and they invariably cut one of the veins in the second joint of the wing which bleeds very profusely.

DR. JONES: I have tried drawing the blood from that vein but find that it coagulates on the skin very rapidly.

DR. A. T. KINSLEY: I would like to ask the Doctor if it is not a fact that this organism forms true endotoxins and if so, would it not be possible to prepare bacterins and finally a vaccine injecting this into such hens as are eliminating the virus in the egg, and so immunize them or hyperimmunize them? Can this not be done in a similar sense as suggested for the pure typhoid carriers?

DR. JONES: I have never tried to treat adult fowls but have tried treating young chicks with the vaccine; it was of no value.

DR. KINSLEY: Did you try the treatment on those that were affected or on those that were healthy?

DR. JONES: On those that were affected and not affected both; in fact I tried it in all ways.

DR. HIGGINS: While this is a condition I have seen something of, I must confess to not having seen the infectious form. The type I have seen has been due to a mechanical obstruction; that is, the day old chicks are fed too soon permitting the gizzard and various portions of the intestines to become distended thus producing the mechanical obstructions. I do not say that infective white diarrhea does not exist, but I have yet to see it. The stoppage occurs at a point anterior to that at which the ureters enter the intestine, and as a result urates only are voided.

There is another point I have not been able to satisfy myself upon and that is with reference to the reported statements from various authors concerning the bacillary nature of the disease. In the bacillary theory we have to use such young chicks to produce the disease. In no case in which I have followed the reports have we had a chick that has not had an enlarged yolk sac. The yolk sac has not been absorbed.

In one instance that came under my observation the white diarrhea was not infectious because I placed other chicks in a brooder with those affected, afterwards placing other chicks in the brooder without cleaning it for the reason that if there was any infection I wanted the full value of the infections agent. I do not want to put myself on record as saying that bacillary white diarrhea does not exist, but these are points I have not felt fully satisfied upon up to the present time.

DR. JONES: I want to say for the benefit of Dr. Higgins that it has been long recognized that the unabsorbed yolk is without a doubt a pathologic lesion; in fact, it is the most characteristic lesion of the disease. We use such young chicks for the reason that they contain the unabsorbed yolk; after the yolk has been absorbed we have great difficulty in infecting them. The age of the chick has a great deal to do with its susceptibility. In all probability the male will not become a spreader of the virus because he lacks the egg yolk to nourish the organism. In the ovarian lesion in the hen the ovarian eggs exactly resemble the pathologic unabsorbed yolk in the chick.

BACILLUS BRONCHISEPTICUS: ITS RELATION TO CANINE DISTEMPER.

By N. S. Ferry, M.D.,

Detroit, Michigan.

In January, 1911, Dr. J. P. McGowan, who was working on grants from the Carnegie Trust and Moray Research Fund, in the laboratory of Dr. James Ritchie at the Royal College of Physicians, Edinburgh, published in the Journal of Pathology and Bacteriology (London)[3] the results of some observations on a laboratory epidemic especially among dogs and cats, in which the animals presented the symptoms of the disease called "distemper." In the April number of the same journal, as a continuation of his first article, he described the organism which was found constantly in all of the affected animals. Dr. McGowan, however, evidently was not aware of the fact that several months previous, in the American Veterinary Review[1], I had published my bacterial findings in canine distemper and had described in detail the same organism. It is also very interesting that Dr. John C. Torrey, Director of the department of experimental pathology of the Cornell Medical School, New York City, who, in collaboration with Mr. Rahe, was working along practically the same lines at the same time, independently isolated the identical organism. In my second article, published in June, 1911[2], in the Journal of Infectious Diseases, my work was described in full, and at the time the name *Bacillus bronchicanis* given to the organism. McGowan isolated his organism from the dog, cat, rabbit, guinea-pig, ferret, monkey, goat and also man in one case. Torrey and myself, however, limiting our work to the dog, went much more extensively into the subject than did McGowan. Torrey, although he did his work about the same time as McGowan, did not read his paper until April, 1912, at the American Association of Pathologists and Bacteriologists, owing to the fact that my first article was published before he had completed his experiments. He, therefore, continued his work which, as yet, has not been published.

During the first part of this year, while working on an epizootic among guinea-pigs, rabbits and monkeys, I was able not only to isolate the same microörganism from the animals, but showed that the infection in guinea-pigs was probably general throughout the United States and was perhaps an important contributory cause of the scarcity of guinea-pigs in this country. In the last April number of the American Veterinary Review[6] this work was reported, and at that time the name of the organism was changed from *Bacillus bronchicanis* to *Bacillus bronchisepticus,* as it was, beyond a doubt, the cause of an infectious disease among many animals. The full report of this work, as well as other work of mine along this line, was published in the July issue of The Veterinary Journal of London[7], of this year.

McGowan, while he did some work on the dog, made his most valuable contribution to the subject with his work on other animals, especially cats[4]. He was the first to show that the organism, which I had previously proved to be the cause of distemper in dogs, gave rise also to pathologic lesions in other animals.

Torrey's work was valuable from the fact that he went so exhaustively into his experimentation on dogs. As his work corroborated mine so fully, a review of his conclusions, which are also found in my article in the Veterinary Journal of London, will be given. He says, "The only microörganism regularly found was *bacillus bronchicanis,* and its regular occurrence, its presence in overwhelming numbers in the respiratory tract in the great majority of cases, its appearance in the very earliest stages of the disease, and its progressive invasion and increase in numbers as the symptoms increased in severity leads one to conclude, from the bacteriologic findings alone, that this bacillus is an important factor in the causation of the disease." "The strains of this organism, which were isolated from sixty-five cases, reveal an absolute uniformity in cultural reactions with the exception of one test. A few strains, thirteen per cent, were encountered which caused a marked reduction of nitrates to nitrites, but with eighty-seven per cent there was no reducing action. All these strains are agglutinated to about the same degree by a serum immune to a single strain. This bacillus, accordingly, is not split up into sub-varieties or groups as is the bacillus dysentericus or the bacillus coli; but all strains comprised within a single species. This bacillus elaborates no exotoxin." He also says, "This bacillus finds its most favorable soil on the mucous

membranes of the respiratory tract, for it invades, as a rule, the organs of the animal to only a slight extent. Of sixty-five positive cases it was present in the liver in thirty per cent, in the spleen in twenty per cent, in the kidney in sixteen per cent, and in the blood in only six per cent." "By experimental inoculation with the bacillus bronchicanis we have been able to induce typical attacks of distemper, with typical incubation period and symptoms complex, and from such experimental infections, the bacillus bronchicanis was recovered readily in pure cultures and in great numbers." Dr. Torrey produced the disease experimentally by blowing the organism or infected dust into the nasal passages with powder blowers. His conclusions were as follows:

"First. Dogs which are immune to natural distemper show no symptoms when exposed to experimental infection with bacillus bronchicanis.

Second. Dogs actively immunized to bacillus bronchicanis are immune to natural distemper.

Third. Dogs recovering from attacks of experimental distemper induced by this bacillus are protected on exposure to natural distemper.

Fourth. The bacillus bronchicanis is the only cultivatable microörganism present with uniformity and in great numbers in the tissues and organs of distemper cases.

Fifth. Typical distemper may be induced in susceptible dogs by infection with pure cultures of the bacillus bronchicanis under conditions simulating natural modes of transfer, and the bacillus may be recovered in pure culture from the organs of such experimental cases."

For the benefit of those who have not had access to all of these reports, and also those who still hold to the old belief of a filterable virus as the cause of distemper, the data of McGowan, Torrey and myself will be reviewed briefly, showing the work upon which we based our conclusions, namely, that the cause of distemper was due to a bacillus which could be grown on the ordinary culture media. The work of Carré, which was merely a short report, of two or three pages, is extensively quoted by authors on veterinary subjects, and yet I have never been able to find in the literature where it has ever been corroborated under conditions which eliminated infection from outside sources. On the other hand, the bacillus in question has been isolated re-

peatedly by several investigators, and the experimental work has been corroborated by all who have undertaken to repeat it.

In reviewing the work of McGowan, Torrey and myself the subject, for convenience, will be taken up under the following heads: Primary infection, agglutination experiments, protective and curative inoculations, experimental distemper.

PRIMARY INFECTION.

From twenty-nine laboratory dogs with symptoms of distemper McGowan found the organism in twenty-seven cases. From sixty-seven laboratory cats with symptoms he found the organism in sixty-five cases. From six rabbits he found it in six cases. From three guinea pigs he found it in three cases.

McGowan says, speaking more especially with regard to dogs, "The disease I have been investigating, 'distemper,' is one limited primarily to the mucous membrane of the nose. From this situation it may spread secondarily to the frontal sinuses and the middle ear, from which it may go to the brain." "The disease may further spread to the conjunctiva, to the trachea, to the lungs, causing, however, in the last case, pneumonia and sometimes empyema." He also says, "Speaking for the disease I have been investigating, it is not of the nature of a septicemia." McGowan was never able to isolate the organism from the blood of any of his animals.[5]

Torrey, on the other hand, working with dogs alone, found the organism in sixty-five cases out of eighty. He says, "We have had about eighty cases in all, comprising all the stages of the disease from the incubation period to the post-mortem, mild cases as well as severe." Torrey's cultural work was more thorough than McGowan's for he made a routine examination of all the organs of every animal. In making the cultures, the animals were as a rule exsanguinated from the carotid, the blood and pericardial fluid cultured and small, but approximately equal portions of the apex and basil regions of the lung, the liver, the spleen and kidney and sometimes of the brain were emulsified and plated, the whole carried out according to Bail's method. Plate cultures were also made from the exudate of the eye, nose and trachea. Of fifty-five positive cases Torrey found the organism in the liver in thirty-two per cent, in the spleen in twenty per cent, in the kidney in sixteen per cent, and in the blood in only

six per cent. Torrey observes that as a rule the bacillus finds a more favorable locality for its primary growth in the trachea rather than in the nose, which also corroborates my work. "From this point," he says, "the virus gradually extends into the larger trachea and finally into the bronchioles, when it generally incites a more or less extensive broncho-pneumonia." This also corroborates my work, for it was found that when the bacillus bronchisepticus was isolated in pure culture from a diseased lung the condition was, as a rule, that of broncho-pneumonia. I have seen but a few cases of lobar or massive pneumonia from which the bacillus bronchisepticus was isolated in pure culture.

Up to the time of the publication of my second article, I had isolated the bacillus from ninety-seven dogs at autopsy. In sixty-eight cases it was isolated in pure culture either from the respiratory tract or blood. From the first sixty-eight cases of distemper (other than experimental cases) I found the organism in twelve out of forty-two blood cultures, (28.5%). Torrey found it in six per cent and McGowan not at all. I attribute this apparent discrepancy possibly to variances in method. If the blood was at all fluid in the heart it was my custom to take from one to four cubic centimeters, or if not fluid, as much of the clot as possible, and plant in fifty cubic centimeters of bouillon. It is a matter of experience that the greatest number of positive blood cultures are obtained when large quantities of blood are planted in correspondingly larger amounts of fluid culture media. In attempting to obtain cultures from the internal organs, Torrey macerated small portions of the tissues from which he made plate cultures, while I planted a large piece of each organ in a tube of bouillon. While the former method has advantages which are obvious, yet I believe the latter method will give a higher percentage of positive findings. Experience with this organism has shown that plating directly from tissues of the animal does not always produce positive results.

My findings with other animals as given in the Veterinary Journal of London are as follows:

Number of animals posted	93
Of these there are—	
Guinea pigs	75
Rabbits	12
Monkeys	6
Bacillus bronchisepticus isolated from eighty-six animals	92.5%

From trachea, eighty-one animals	94.2%
From lung, forty-six animals	53.5%
From liver, thirty-four animals	39.5%
From blood, twenty-nine animals	33.7%
Pure cultures from trachea, seventy-four animals	86. %

The points, concerning the disease in these laboratory animals, which should be emphasized, are as follows:

1. None of the guinea-pigs or monkeys showed any signs of an infection of the nasal cavity or the eyes.

2. The infection was probably primarily in the larynx and trachea, as the organism was found in pure culture in those situations in nearly every case.

3. The infection in these three species of animals was that of septicemia in the majority of cases, as the bacillus was isolated in pure culture in many of the cases from the heart's blood and abdominal organs.

4. All the guinea pigs and nearly all other animals suffered in the earliest stages of the disease with a profuse diarrhea.

5. If the case was taken early enough, the bacillus bronchisepticus could be isolated without much difficulty from the intestinal discharges, and often in nearly pure culture from the mucus of the small intestines, where congestion was most in evidence.

6. Some of the rabbits showed an infection of the nasal cavity, and a few of the eyes, but many died with only an infection of the trachea and bronchi, and in nearly every rabbit the bacillus could be isolated from the blood.

7. None of the monkeys showed an infection of the nasal cavity or eye, but did give evidence of an infection of the trachea and bronchi, and a septicemia, as the organism was found in pure culture in the trachea, bronchi and blood. One of these monkeys had a typical bronchial cough.

One of the most complete proofs of the relation of bacillus bronchisepticus to canine distemper may be found in the accompanying chart. This chart represents an epizootic which took place among a number of pups I was raising for experimental purposes. A dog infected with a typical case of distemper accidentally came in contact with the keeper of these pups, with the result that nearly all became infected. The pups were watched, and from the time the first sign of the disease made its appearance until death, every abnormal symptom was recorded. This chart was of value, for it threw more light on the bacteriology and

symptomatology of the disease than I could have gathered from any other source of information. A glance at the chart will show the points which should be emphasized. From the dogs killed early in the disease the bacillus bronchisepticus was isolated from the trachea in pure culture. From those killed later and others, which were allowed to die natural deaths, secondary organisms were isolated, together with the primary organism; the bacillus bronchisepticus. From those which recovered from the disease and were not vaccinated the bacillus was isolated in pure culture from the trachea, while those which were vaccinated, with one exception, did not show the organism.

The first symptom to appear was either a cough or convulsion, usually the convulsion. This was followed shortly by diarrhea. Then came the serous discharge from the nose followed by that from the eye. Then appeared the purulent discharge from the nose, closely followed by the purulent discharge from the eyes. As soon as the purulent discharge from the nose and eyes was noticed the trachea was found to contain the secondary organisms as well as the primary. Dog 105 was the first to become infected while 106 and 107 soon followed. The remainder of the dogs were probably infected from 105, as they were all running together in a large room. The period of incubation accordingly for the epizootic was five days. I have found this to be about the average period of incubation, whether dogs were experimentally infected, or had accidentally contracted the disease.

AGGLUTINATION EXPERIMENTS.

The agglutination work was carried on extensively by all three of the experimenters, and all came to practically the same conclusions, namely: that the reaction was specific for the bacillus; that serum from dogs spontaneously infected gave positive reactions, although not in as high dilutions as those experimentally infected, or those artificially immunized against the bacillus, and that the serum from healthy dogs which had not previously suffered with distemper did not agglutinate the organism.

Torrey says that, "Dogs which are sacrificed during the earlier stages of the disease and those which have succumbed or seem about to die from the infection have not, as a rule, developed any agglutinins for this bacillus. On the other hand animals which are holding their own, are recovering or have recovered fully,

PER.

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	Cough	Cough	Cough
....	....	....	....
a	Diarrhea	....	....
us)	....	Diarrhea	....
....	Nose (serous)	....	Nose (serous)
us)	Nose (purulent)	....	Eyes (serous)
yes t)	....	....	....
....	....	....	....
....	....	....	....
d	Recovered	Recovered	Recovered
i-	Sterile	Sterile	Sterile

Vaccinated

carry agglutinins in their blood which clump the bacillus bronchicanis in dilutions of from one in twenty-five to one in five hundred." "This tardy development of agglutinins," he thought, "may be due to the slight properties of the bacillus."

McGowan says: 1. "When an animal is immunized with a certain strain, a fairly high agglutinative power is developed in its serum against that strain." "This agglutinative power never was higher in the cases examined than one in one hundred and twenty and rarely above one in sixty."

2. "In such an animal the serum generally has marked agglutinative properties for strains of the organism other than that with which the animal was immunized." "Here, although the organisms were of very different strains from that used for immunization, some five cats, and some four dogs, the agglutination is almost as marked as with the organism used for immunization."

3. "Animals in which there is no evidence of distemper, e. g., healthy animals brought into the laboratory and killed at once show no agglutinating properties in their serum against the organism."

4. "Where an animal is suffering from distemper, and when the organism is found in it during life or post-mortem, the serum of that animal may or may not agglutinate a strain of the organism."

In my agglutination experiments it was found that the serum from all dogs suffering with the disease gave an agglutination anging from one in forty to one in eight hundred, while the erum from those artificially immunized against the organism ave an agglutination ranging from one in eight hundred to one ı four thousand. The test of one serum against several differ-t strains ranged from one in six hundred to one in six thou-ınd. Here again the difference in method may have had some-ing to do with the great range between McGowan's results and ine. In all my experiments the following procedure, which was ound after many trials to give the best results, was adhered to. ne emulsion for the agglutination tests was made from eighteen ur agar cultures, taken off in physiologic salt solution, to which .s added enough formaldehyde to make a one per cent solution. This emulsion was allowed to stand for five hours at room temperature, which time was sufficient to kill all organisms. The tubes were placed in the incubator and were examined at the end

of twenty-four hours. Serum from dogs which had never suffered with the disease gave negative results.

PROTECTIVE AND CURATIVE INOCULATIONS.

As this paper was intended to show the relation of the bacillus bronchisepticus to dog distemper, nothing will be said at this time concerning the vaccines made from the organism, except in so far as it aids in proving the specific nature of the bacillus. Relative to vaccines, McGowan carried on but few experiments, while Torrey makes no mention of his work along this line, except in his conclusion. He says, "Dogs actively immunized to bacillus bronchicanis are immune to natural distemper." My work with vaccines made with this organism dates back to about June, 1909, when experiments were undertaken to immunize and treat dogs with killed and live cultures of the bacillus. A large number of experiments have been carried on from that time to the present with vaccines of different strengths, with one or more inoculations at varying intervals, and it is safe to say that the majority of pups can be protected, provided they are injected a certain time before exposure. It has been found that for practical purposes, three injections, with a few days interval between injections, give the best protection. Lately, experiments have been carried on with pups only a few days old, while they are still nursing their mother, and so far no ill effects from the injections have been seen, while it would appear the large majority of the pups are protected. As these experiments are not finished it is impossible to draw any conclusions of value. If the results are favorable the benefits of this protection cannot be overestimated. Experiments conducted the past two or three years have shown that about sixty to seventy per cent of distemper dogs may be saved providing the vaccine is given early in the disease, and the cases are as carefully handled as they would be without the treatment. I believe also that better results are obtained with a vaccine made from several strains of the organism than from one. As I have never been able to produce the disease by subcutaneous inoculation, it has been a safe procedure in my hands, and with more lasting results, to immunize with suspensions of live organisms. For practical purposes, however, that method is out of the question.

EXPERIMENTAL DISTEMPER.

It is an interesting, but an explainable coincidence, that all investigators who have championed various microörganisms as the cause of canine distemper have claimed to have produced typical distemper with their respective viruses. From the experience of McGowan, Torrey and myself, it would seem that infections from outside sources play an important part in these results. Enough stress was not laid by others on protecting the experimental animals from outside contamination. This great source of error was recognized by the last named investigators, who used the utmost precautions with all their experimental inoculations, and it was only after their work was thoroughly checked up that they were willing to concede the bacillus was the etiologic factor in this disease. I will quote from both McGowan and Torrey on this subject.

Torrey says, "Most of the investigators who have isolated various microörganisms from distemper dogs have claimed to have produced the same disease with the bacillus which they have considered the etiologic factor. It would seem, however, that with a few exceptions the importance of excluding contact infection, direct or indirect, in their experiment animals has not been given due consideration. In our experiments the dogs used for experiment infection have been kept in a different part of the building and far removed from all possible contact with cases of spontaneous distemper. They have been cared for by special attendant who has kept away from all other dogs in the laboratory. These dogs of which the history was known in most instances, were placed in sterilized cages and kept for at least fourteen and generally over twenty days before any experiment infection was attempted,—in order to eliminate any possible outside infection. After inoculation they were placed in a room never before used for dogs, in new cages and cared for by a special attendant. It has been claimed by Carré that this disease may be experimentally induced in dogs by a filterable virus. Under the conditions, however, just outlined I obtained uniformly negative results with filtrates from scrapings of the nasal and bronchial passages of distemper dogs and filtered blood, although in earlier and less carefully controlled experiments some apparently positive infections occurred. In these cases, however, the possibility of accidental transmission of the virus from distemper cases could not

be eliminated. Our experiments certainly indicate that canine distemper is not due to a filterable virus."

McGowan says, "Not one of those who have stated that they have found the organism of distemper seems to have appreciated the infectiousness of the disease, for there is no mention in their papers of particular or indeed any care having been exercised to ensure complete isolation. Neglect to mention such precautions in such a case cannot be overlooked." "The lack of such precautions would explain also the regularity with which the various observers have produced the disease in animals by subcutaneous inoculation of their organism."

I will quote from my second paper showing also the precautions that we felt necessary to take in order to prove conclusively that we were dealing with the causative organism.

"In order to carry inoculation experiments to a successful termination and be sure that the dogs were not accidentally infected, three large rooms in buildings isolated from each other were used, each room being in charge of a different attendant. The pups used were taken directly from their mothers as soon as weaned. After making sure that the pups were in a healthy condition they were at once given a bath, and then thoroughly soaked in a germicide solution and placed in the incubation room. Here they were allowed to remain from three to six weeks under strict observation, in the charge of a man who kept away from other dogs. From the incubation room the pups were placed in another room, where they remained under observation at least three weeks longer before experiments were made. The floors and walls of these rooms were of cement, making it possible to wash and spray thoroughly with a germicide solution as often as deemed necessary. The rooms were thoroughly disinfected and cleaned before the reception of each lot of pups and after each experiment. They were under lock and key and no one was allowed to enter except the attendant, laboratory assistants and myself. Following these precautions and with careful feeding and handling, one could be reasonably sure that all abnormal symptoms following inoculations were due directly and solely to the treatment. In a third room, in a building far removed from the first two, were kept all the convalescing as well as all sick dogs and others under observation and treatment. All autopsies were held in the laboratory, where cultures could be taken conveniently without fear of contamination."

In speaking of his experimental work Torrey says, "It has been our aim in these infection experiments to approximate as closely as was feasible, natural modes of transfer of the disease. Without doubt the port of entry is the respiratory tract and the vehicle of transfer the discharges from the nose or throat either in a moist or dry state." "Scrapings from cultures of this bacillus were dried, partially pulverized and mixed with dry sterile dust. By means of insect powder blowers this infected dust was projected into the nasal passages and mouth of the experimental animal. After an incubation period of three to thirteen days definite symptoms of the disease developed in six out of seven of these animals, the attacks ranging as is the case in natural conditions from mild to very severe and fatal issues." "The symptoms developed included rhinitis and bronchitis with persistent cough, typical broncho-pneumonia, vomiting, bloody diarrhea, conjunctivitis, and in three instances the appearance of a typical pustular eruption of the skin."

In my second article was reported in detail the work carried on by me in order to attempt to produce the disease experimentally. Between forty and fifty dogs were used and in twenty-eight of these the disease was produced, ranging from the mild type to the very severe. In several instances, following typical symptoms of the disease, death was the ultimate outcome. Being led to believe from my previous autopsy findings that the primary seat of the disease was in the larynx or trachea, the organisms were introduced experimentally into the trachea by means of hypodermatic syringes, the medium of transfer being either bouillon or physiologic salt solution. In this way there was practically no chance of secondary or other pathogenic organisms accompanying the specific bacillus to its seat of possible infection. Any infection, accordingly, resulting in this region, from which this organism could later be isolated in pure culture, would be caused by the organism in question. Symptoms, therefore, accompanying and following this infection would, a priori, be the result of the infectious process set up by the organism. While this procedure has its advantages, the method used by Torrey which similates natural modes of introduction of the organism was just as reliable and possibly of more value.

In recapitulating I will state that the bacillus bronchisepticus was found by three investigators independently in different parts of the world, to be the cause of canine distemper. The organism

was isolated from the large majority of cases in pure culture, and was found to agglutinate serum from dogs suffering with distemper as well as those immunized and experimentally infected with the organism, while all normal controls were negative. Suspensions of both live and killed organisms were found to protect dogs from natural distemper, and dogs experimentally infected were found also to be immune to natural distemper. Typical distemper was induced, and the organism again isolated and grown in pure culture under conditions excluding outside source of infection, thus fulfilling Koch's Dictums to the letter, and disproving thereby any theory which may previously have been held that the disease is due to a filterable virus, or a virus which is not able to be grown on the ordinary culture media.

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DISCUSSION.

THE CHAIRMAN: This very interesting paper is now open for discussion. We have with us a number of gentlemen probably familiar with the conditions under which the doctor worked, including a number of autotherapists and I hope we shall have a lively discussion.

DR. PIERRE A. FISH: Mr. Chairman, I have inferred from what the doctor has said that the usual method for taking in the bacilli was through the respiratory tract. I would like to inquire whether there was any evidence of its being acquired through the alimentary tract or in any other way than through the respiratory tract? Also, I would like to know if in other animals, such as the cat, he has found similar difficulties.

DR. A. T. KINSLEY: Mr. Chairman and Members of the Association:— I am very much interested in the problem of canine distemper. Those who are in practice realize the multiplicity of symptoms evolved during the course of this disease and unquestionably many of us have made mistakes in the past concerning this disease owing to the variation of the symptoms. However, I believe at the present time practically every practitioner can readily diagnose and does readily recognize distemper even in any one of the variety of forms it is liable to assume.

I have had just a little experience with the bacteriologic side of this disease and when Dr. Ferry first described this organism or soon there-

after, I happened to be visiting his laboratory, and thus obtained a culture. Later organisms, identical, both culturally and tinctorially with the organism sent by Dr. Ferry, were isolated and subsequently these organisms were identified by the agglutination test. We endeavored to prove that this organism would produce distemper, but could not make the conditions efficient to ward against accidental infection. The inoculated animal contracted distemper, but I am not ready to say whether it was from injection or the result of some other outside contamination. As you know, in the cities there are so many different methods of transferring infection that it is almost impossible under ordinary conditions, to absolutely eliminate the possibility of outside infection by mice, rats or even by cockroaches, of which we have numerous representatives in our city. (Laughter.)

We have isolated an organism that is apparently identical, but are not ready to say it is the organism that when introduced into the animal will produce distemper. The evidence that Dr. Ferry has given here seems to bear that out, and I want to say that the doctor is to be congratulated on the work that he has done. I thank you. (Applause.)

Dr. R. W. Ellis: Mr. Chairman and gentlemen, I was unfortunate in having been called out, so that I could not hear all of Dr. Ferry's paper, and I only heard the last few remarks of Dr. Kinsley in regard to it. Of course, I cannot add anything from the viewpoint of the laboratorian; I can only say a few words from the practitioner's standpoint on the use the canine distemper vaccine. Most of my experience with distemper vaccine, has been with that prepared after the manner described by Dr. Ferry, and though I have used one or two other distemper vaccines with variable results, I think I have used steadily for about two years, perhaps two and a half years, the vaccine of Parke, Davis and Company; indeed, ever since the first lot of it came out. During the first year I did not have very good results, this I afterward attributed to the fact that I had only treated incurable cases with vaccine.

Perhaps the above fact as well as some improvement in the vaccine accounts for the difference in my former and present results. Possibly Dr. Ferry will be able to tell us why my results have been more favorable during the last year; so satisfactory, in fact, that it has become a routine treatment with me.

I never take a case of distemper that I do not treat with vaccine. Whether it is an advanced or a case in the early stages of the disease. I have never, however, used to any extent the Parke, Davis vaccine that is now being prepared in different grades. The vaccine that I have been using has been put in one cubic centimeter vials all of the same strength, and I have used that in four separate treatments four days apart as follows: one cubic centimeter at the first treatment, two cubic centimeters at the second treatment, three cubic centimeters at the third and four cubic centimeters at the fourth, making ten cubic centimeters all together in the four treatments and the results have been very satisfactory. I can scarcely recall any that have not responded.

Of course I do not rely absolutely upon vaccine. If the dogs are not

eating and show a tendency to run down, I medicate them accordingly. Some of them come in very much emaciated and yet they have responded to the vaccine, when properly medicated as well.

If I may be permitted to depart for just a minute from vaccine, let me say that I give nuclein in about fifteen minim doses. I drop it on the tongue pure in some cases, but usually, dilute it so that the animal gets fifteen minims in a teaspoonful of water. That is given right along at four-hour intervals between the vaccine treatments and if it seems necessary I also prescribe very small doses of strychnin, especially in very weak cases. About three times a day has been my method of using the strychnin in conjunction with the other things, and the results have been satisfactory.

In regard to autotherapy, I have not had an opportunity as yet to test that out in cases of distemper. I was prepared to do so two or three times, but unfortunately on each occasion that I had taken pus in anticipation of trying it, the dogs did not come back, presumably having died and consequently I cannot say anything about autotherapy in the treatment of canine distemper. (Applause.)

Dr. H. P. Hoskins: Mr. Chairman, I would like to ask Dr. Ferry a couple of questions: First, How many times in your experience of cases of distemper did you get the characteristic blebs, or skin lesions; second, how do you account for the apparent immunity of dogs over one year of age, when exposed, although they have never had distemper?

Dr. A. H. Baker: Distemper to the average practitioner is an interesting subject because it is recurrent and so very frequently fatal. I am particulary interested as well as pleased and gratified to know that Dr. Ferry has proven to our satisfaction that he has discovered the specific virus. I would like to ask Dr. Ferry in ordinary everyday practice what would be the proper procedure where a dog comes down with distemper in a private family and there are little children? In explanation of this question, let me say that it is frequently held by medical men that young children, four years and under, frequently contract disease from sick dogs, or dogs affected with distemper, especially measles, scarlet fever, even diphtheria, and possibly some other diseases. In order to be on the safe side as a practitioner I always recommend that a dog sick with distemper be taken out of the family where there are little children and whether such procedure is necessary or not is the question that I would be glad to have Dr. Ferry enlighten us upon.

Again, is there any use in injecting a sick dog exhibiting purulent manifestations with any antitoxin or vaccine or other preparation with the view of ameliorating the injurious effect of this secondary infection he spoke of?

Dr. L. A. Klein: I want to ask Dr. Ferry, if he will, in summing up this matter, indicate the symptoms which he considers are due to the bacillus that he isolated, and those symptoms which are due to secondary infection.

The Chairman: Do you follow that, Dr. Ferry?

Dr. N. S. Ferry: Yes, I do.

DR. JOHN REICHEL: There are one or two things that I would like to bring out in connection with the bacillus bronchisepticus. The work of McGowan of Scotland, Torrey of New York and Ferry of Detroit seems to have brought out one thing and that is that the bacillus bronchisepticus is at least as closely related to distemper in dogs as the bacillus cholera suis is to hog cholera in hogs. The bacillus bronchisepticus can be readily demonstrated in dogs exposed to distemper, afflicted with the disease or making recovery. This does not mean, however, that the organisms can be demonstrated in all dogs in that it has been shown that dogs, particularly puppies reared away from all possible exposure to the disease do not harbor the bacillus. The roll the organism plays, however, in the cause of canine distemper is not unquestionably proven.

DR. W. HORACE HOSKINS: Mr. Chairman, I want to ask Dr. Ferry what the symptoms were in cases where he has had very great success in the use of vaccine and how far the disease had made itself apparent where those results were obtained? I would like to ask further, if in those cases among which he had one that was a well defined case of distemper, whether he had used vaccine in the other dogs that had given no evidence of being infected as far as physical examination was concerned?

DR. N. S. FERRY: Relative to the disease being produced by the organism entering into the alimentary tract, I am unable to answer that question. The very fact that the organism is found in the intestine, in the early stages of the disease in the guinea pig, may mean that the organism may be taken in through the alimentary tract, and produce the infection. But as far as the guinea pig, the dog, the rabbit and the monkey is concerned, I have found it in all of those cases in pure culture in the respiratory tract, where in other parts of the body it would be combined with secondary organism. It looks as though it were primary in the respiratory tract, and probably that is where the entrance is made.

As far as the cat is concerned, I have done no work on the cat with the organism. Dr. McGowan has done more work with the cat than any other animal and has isolated the organism in pure culture from those animals but was not able to obtain conditions whereby he could carry out his experimental inoculations perfectly. Just as Dr. Kinsley has found, and the rest of us, it is almost impossible to get conditions where you can be sure that the infection is not brought in from an outside source. We, after all, will have to leave that experimental question to one side and depend upon the other tests to prove the specificity of the organism; the agglutination tests, and so forth. It is impossible to eliminate outside infection.

I found with the vaccine, as Dr. Ellis pointed out, that when we first started in we did not seem to get the result with the curative vaccine that we did later. I think that can be explained. In the curative vaccine the streptococcus and staphlococcus are combined with the primary organism. In all of the cases with pus discharges I found the staphlococcus. Later I obtained better results from the combined vaccine than with the vaccine made with the specific organism alone. If the case is taken as

early as possible the result is good. You cannot cure all cases with vaccine. It is not a panacea, as has already been said. The vaccine, for best results, is used for prophylactic purposes. We all know that if you take the case in its early stages and give the curative vaccine you obtain good results in sixty per cent of the cases. If you treat with the vaccine, use it the same as any other therapeutic agent and watch the symptoms. Vaccine is an aid to the regular routine measures. If you use vaccine you get better results than if you treat without it, at least, in the majority of cases. Therefore, do not rely absolutely on any one therapeutic agent as a curative.

Again, the question was brought up in reference to the percentage of cases in which I saw the characteristic skin lesion. I cannot tell exactly. I think in experimental cases I saw it about six or seven times. You know that for years it was a question in England whether a case could be called distemper without a skin eruption. With the large majority of distemper cases the dogs do not have skin eruption. At least, I have found it so, and I have had about five hundred distemper dogs under observation.

The question was brought up, in the ordinary practice, what to do with a dog suffering from distemper. Dr. McGowan has found the organism in the respiratory tract of the human. Captain Douglas has found it in two or three cases. If that is so, though I have done no work along that line, I do not see why children could not become infected with the organism. If it is so, it would be good practice to isolate the dog.

The question was brought up, comparing the condition in canine distemper to that in hog cholera. I know very little about hog cholera. Dr. Carré was the first to claim that distemper in dogs was due to filtrable virus. His article on that subject is only about two or three pages long, but as far as I know it has not been corroborated. I was not able to corroborate it and neither was Torrey or McGowan. We have not been able to take the blood or any of the scrapings from the nose or throat, and under proper conditions, produce distemper. Dr. Carré says nothing about the protection of his dogs from outside sources of contamination.

I do not know whether the bacillus found in hog cholera can be shown to be specific in all cases as far as the agglutination test is concerned and I do not know whether a typical disease can be produced with the organism; but, so far as the filtrable virus question is concerned, Carré's work looks less feasible than hog cholera from the fact that his work has never been corroborated, whereas three of us working in different parts of the world isolated and practically proved that this organism was the cause of distemper. I believe under the conditions in which I carried on my work and under the conditions Torrey used, we produced the disease.

Dr. John Reichel: The bacillus cholera suis, without the presence of an invisible virus of hog cholera, is capable of producing all of the symptoms and lesions of hog cholera if it is sufficiently virulent when injected.

In dogs, afflicted with rabies, classed as one of the invisible virus diseases, the nerve ganglion shows typical inflammatory changes manifested by degenerative changes in the ganglionic cells with proliferation of the endothelial cells making up the lymph sacs surrounding each ganglionic nerve cell. Similar degenerative and proliferative changes but not so well marked may be demonstrated in dogs dead of distemper. In distemper the changes may be due to toxins or an invisible virus passing through the ganglion. It would therefore be of interest to know if the bacillus bronchisepticus produces a toxin which is capable of bringing about these changes in the ganglion. I have examined the ganglion of dogs afflicted with other bacterial diseases without finding such changes in the ganglion so well marked in dogs dead of rabies and less marked in dogs dead of distemper.

Dr. N. S. Ferry: I feel satisfied that the bacillus bronchisepticus is the primary cause, but it is possible that it is a secondary one, of course, that, however, is for other workers even more than for myself to prove. As I tried to show in the chart, as far as I can see the only symptom that is due alone to the bacillus bronchisepticus is the cough, the symptom resulting from an inflammatory condition of the respiratory tract. We get convulsions in children in all sorts of infections as one of the earlier symptoms, while in adults a chill is noted. I cannot say for sure, but it is probable that these symptoms are due to toxins. The only symptom primarily is that resulting from the inflammatory condition of the respiratory tract and due to the infection with the bacillus bronchisepticus. Almost immediately on top of this come secondary infection. Then you can have all sorts of symptoms which I will not name. Therefore, as I have said, to get your organism pure you must take your case early.

I knew that the filtrable virus question would come up. It always comes up. It is always on hand, and it is a hard thing to prove that the disease is not due to a filtrable virus. Carré, and those who claim it is a filtrable virus, and any number claim it, although they have done no work on it, have never proven their point. Distemper is a disease of the young and after the dog passes a certain stage he is practically immune from the infection.

Dr. L. A. Klein: Has any study ever been made of the bacteria flora of the trachea of the normal dog? It strikes me that that might throw more light on the relations of this organism to distemper than any other study.

Dr. N. S. Ferry: I have made a study of it, and in dogs that I felt sure were normal, I have never found the organism in the trachea.

Dr. W. Horace Hoskins: I would like to ask Dr. Ellis in regard to those cases where you got such excellent results what were the symptoms?

Dr. Robert W. Ellis: I think I can say, Dr. Hoskins, that during the last year I have had good results in cases that have given me all degrees of symptoms, or better, all degrees of distemper as indicted by the symptoms. I have had cases with a history of having been sick for three or four weeks though they have not shown any marked symptoms of distemper up to the time when brought to me other than that they did not

eat, had a slight cough which at times was associated with vomiting especially after eating and showed a temperature of 102.5 degrees to 103.5 degrees, or even 104 degrees Fahrenheit. Of course all were young dogs, six or eight months old. Careful examination of the lungs would warrant exclusion of pneumonia, but possibly a little bronchitis existed in some instances. Such cases have responded nicely to canine distemper vaccine. In addition to the symptoms I have mentioned others have shown fetid diarrhea or black, tarry stools, together with more or less marked skin eruptions, and so on; some of them had discharges from the eyes and some from the nose. In other words, typical cases of advanced distemper, but had not yet passed to a condition of emaciation. I have, of course, had others that have given me all the other symptoms, and have been positively emaciated.

I examined a dog on Sunday morning before I left home, belonging to this latter class. When first brought to me he showed all the symptoms of distemper together with emaciation. I gave him distemper vaccine and prescribed a dose of a hundred and thirty-fourth of a grain of strychnin three times a day. Every three hours in the day he was given nuclein, and everything in the form of nourishment we considered could be readily assimilated, so that the digestive apparatus was not required to do much work. Later in the course of treatment cod liver oil was added as a food. On the start the temperature was 103.5 degrees Fahrenheit. The last treatment was given one week prior to the Sunday morning that I left and I had arranged to have him come back, because at the last treatment the temperature was 102.5 degrees Fahrenheit, which is a common condition in my experience. In fact, they will often carry that temperature some three weeks after all acute symptoms are under control even though the dog is eating and doing very well; the elevation of temperature being the only evidence that the dog is not in a perfectly normal condition. This dog then showed me last Sunday, one week after the last vaccine treatment, a temperature somewhat exceeding 102 degrees Fahrenheit, but his owner stated that the dog ate everything that he would give him, and indeed, he showed every encouragement that he would make a complete recovery.

Dr. A. T. Kinsley: What per cent of fatality, Dr. Ellis?

Dr. Robert W. Ellis: I cannot give you any fixed percentage of fatality. The first year, when this vaccine treatment was passing through the experimental stages in my hands, the percentage of fatalities was probably seventy-five; but during the last year, that I am speaking particularly of just now, I do not think it has gone beyond ten per cent.

Dr. W. Horace Hoskins: Practically all of the symptoms that Dr. Ellis has described may be found in dogs in a variety of conditions and diseases. I have used the vaccine for more than two years, or from the time it was first put forth by the firm for experimental purposes. If the disease is established I have not yet found a vaccine effective in doing much for the case. However, where I have found the disease and there are other young dogs presenting no symptoms, I have used the vaccine very extensively, and I can say that in those outbreaks I have had very

few cases subsequent to its use. But that is no absolute proof at all of the value of vaccine because they were simply exposed dogs. It was, of course, comforting to me that I was able to prevent apparently any additional cases in what seemed to be a threatened outbreak of the disease. Where the disease is sufficiently pronounced by clinical symptoms I have not found vaccine at all efficacious.

DR. ROBERT W. ELLIS: I would like to ask Dr. Hoskins to define a typical case of distemper. What are the symptoms?

DR. W. HORACE HOSKINS: I consider a clinical case of distemper manifest in a dog with catarrhal symptoms of the eyes and upper air passages, some distress in breathing, great langour, depression, blebs over that part of the body where the skin is free of hair, and where dogs with a similar group of symptoms have gone on to dissolution and death. With the symptoms such as you have described I frequently find that the dogs are suffering from intestinal parasites as much as from anything else. The vaccine I used was furnished by the firm of Parke Davis and Company and at their request, because of the great number of fatalities. Later I used one as prescribed by Dr. Ferry.

THE CHAIRMAN: One good thing about this discussion upon vaccine is that I have not heard anyone say it is harmful. I would like to inquire of Dr. Ferry on this point and also concerning the conveyance of infection by apparently normal dogs.

DR. N. S. FERRY: I have had some young puppies in the laboratory and in the stables where infected dogs were kept that showed no symptoms whatever. They were running around with the infected dogs constantly. I examined some of them and obtained the organism in pure culture from the trachea, which shows that dogs apparently normal can be carriers of the infection. Therefore, the question of the value of the results of the experimental distemper work is still an open one. You may get some carriers, just the same as carriers of diphtheria in human beings. Children in school sometimes have the bacilli in their throats and at the same time showing no symptoms of infection through the diphtheria bacillus. Therefore, apparently healthy dogs become carriers of distemper bacillus.

About the point of vaccines not being harmful, I feel that I can say something, although when I wrote my paper I purposely left the vaccine question out. I wrote my paper from the scientific aspect and not therapeutic, referring only to the relation of the bacillus to the disease. Since this is a family gathering I will discuss that question and say it is just the same as with any vaccine. Where the patient's resistance is low, if you give too large a dose of vaccine you will lower the resistance even more and therefore the results would be harmful. You must be as careful about giving a vaccine as you are about giving strychnin or any other drug, an overdose of which would be harmful. Ordinarily, for prophylactic purposes it makes very little difference, you can give a big dose. But when it comes to curative treatment where the dog is infected and nature is fighting the infection, too large a dose would tax nature too much and she would rebel. In giving vaccine for curative purpose one must be careful and go cautiously with the first dose, and if the reaction is too severe cut down on the second injection.

As far as intestinal parasites are concerned, I have found any number of dogs affected that way. In fact the larger number of dogs have intestinal parasites. Distemper can exist without any of the ordinary symptoms. I have seen dogs starting with a convulsion in the morning as the first symptom and dying that afternoon, the bacillus bronchisepticus appearing in the respiratory tract and in the blood in pure culture with no visible lesions or intestinal parasites that I could find. With those dogs I obtained typical agglutination tests with the organism in question.

Dr. W. Horace Hoskins: I have never seen a recognized case of distemper of that kind.

Dr. N. S. Ferry: I know you have not. It is not recognized unless one has been studying the dogs before they became infected. These pups were in my laboratory, perfectly normal to all appearances when they were attack with convulsions. Perhaps the dogs had not been feeling well for two or three days but they were not able to say so and we did not recognize the fact. Probably the infection had been going on for several days. The first and only symptom was the convulsions and the infection was so severe it killed the dogs. Therefore as I have said, distemper may be a disease hardly recognizable in the early stages.

Dr. A. T. Kinsley: How long does immunity last when produced by vaccine?

Dr. N. S. Ferry: I cannot tell you because we have not had the opportunity to try that out under favorable conditions. That is a question that must be answered by time.

Dr. W. Horace Hoskins: How often would you advise giving the vaccine, where it was to be used for prophylactic purposes to dogs under two years of age? That is, how soon after the first application of the vaccine would you repeat in dogs under two years of age?

Dr. N. S. Ferry: Judging from the experience that I have had, I think one year. But if a man has a very valuable dog and wants to be absolutely sure, I would advise giving it every six months.

Dr. W. Horace Hoskins: I have been doing that. How many doses do you give?

Dr. N. S. Ferry: I give three.

*THE SERUM REACTIONS AND SERUM DIAGNOSIS OF DOURINE.

By E. A. Watson,

Lethbridge, Alberta.

Numerous efforts have and are being made to diagnose trypanosome infections by serologic methods of determining the presence of specific antibodies in the blood of the patient or animal. Several of the methods in vogue are based upon the phenomena of complement fixation or deviation which, when applied to syphilis, glanders and certain other diseases has been found in the hands of many workers to be an eminently successful test. In its application to trypanosome infections, however, literature records many disappointing results, some workers experiencing variable, not constant or non-specific reactions; but in other hands the test has been found reliable and is considered as a diagnostic aid of highest value. The discrepancy in results is doubtless due in great measure to the different technical procedures employed by the different workers, or even to a varying or faulty technique of the individual worker also to the use of antigens of varying qualities and consistency.

The specificity of complement fixation phenomena is dependent upon a combination of antibody and antigen of specific origin, the antibody being present in the serum of the infected patient and the antigen one of the reagents specially prepared for the test and added to the serum with the other reagents in definite quantity. One of the chief difficulties encountered in applying the test has been in finding a suitable antigen and various methods are employed in the obtaining and preparation of it; it can be extracted from the organs and tissues of infected animals and in various ways but a more satisfactory method is to extract it from the specific organism itself. It is to be hoped that a standard mode of procedure may soon be established and a uniform technique determined and rigidly adhered to by practical workers, otherwise confusing or seemingly contradictory results will continue to be recorded.

*Contribution to the report of Committee on Diseases.

Serum reactions that appear to the writer of unquestionable value in the diagnosis of dourine are obtained by:

First. The complement fixation test.

Second. An agglutination test.

Third. A precipitin test.

Fourth. The acetic acid test.

These will be considered separately:

THE COMPLEMENT FIXATION TEST.

Complement fixation as applied to dourine is similar to complement fixation tests in general, the principal difference being in the preparation of one of the reagents, namely—antigen.

To obtain antigen the blood of five, ten or more rats at the height of infection, that is to say, when the blood is swarming with trypanosomes, but before the animals have become stupefied or appear in a dying condition, is collected in one or more sterile bottles containing glass pearls and at once defibrinated. The blood is then pipetted into narrow tubes (about three-eighths of an inch in diameter), centrifuged and when the serum has become quite clear it is pipetted off, the white layers—the trypanosomes—removed from each tube into a fresh tube, with as few red corpuscles as possible. To this is added salt solution in which the trypanosomes are well shaken and again centrifuged. This process is repeated five or six times with fresh salt solution or as often as is necessary to obtain the trypanosomes absolutely free from blood or serum. When this stage is reached the trypanosome emulsion is added to salt solution in the proportion of one in ten and with sterile glass pearls is placed in a shaking apparatus for two or three days, when it is filtered through a Berkefeld, the filtrate constituting the antigen. Instead of filtering the liquid may be centrifugalized until the supernatant fluid can be taken away quite clear, but as a rule filtering is advisable.

The other reagents in the test are prepared in the usual way, fresh guinea pig's serum furnishing the complement, the serum of rabbits sensitized to sheep's blood corpuscles the hemolytic amboceptor, washed sheep's blood the corpuscle suspension, and dourine horse-serum the antibody. After titration of the amboceptor, complement and antigen the final determinative test may be undertaken as in the following table (supposing, for instance, the preliminary tests have shown that 1 to 2500 is the proper dilu-

tion of amboceptor, 0.4 cubic centimeter the required amount of diluted complement, and 0.05 cubic centimeter of antigen).

Final Determination Test.

Tube No.	Dourine antigen. 1:10	Dourine serum. 1:5	Complement. 1:10	Salt solution. 0.85%	Amboceptor. 1:2500	Sheep's Corpuscles. 1:40
	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.
Positive control:						
(1)	0.05	1.0	0.4	1.55	1.0	1.0
(2)	0.05	0.5	0.4	2.05	1.0	1.0
(3)	0.05	0.1	0.4	2.45	1.0	1.0
Negative controls:		Normal serum.				
(4)	0.05	(x) 1.0	0.4	1.55	1.0	1.0
(5)	0.05	(y) 1.0	0.4	1.55	1.0	1.0
(6)	0.05	(z) 1.0	0.4	1.55	1.0	1.0
Antigen control:						
(7)	0.10	....	0.4	2.50	1.0	1.0
Without antigen:		Dourine serum.				
(8)	....	1.0	0.4	1.60	1.0	1.0
(9)	....	....	0.4	2.60	1.0	1.0
(10)	....	....	0.4	3.60	....	1.0
(11)	....	....	....	3.0	1.0	1.0
(12)	....	....	....	4.0	....	1.0

1 hour in thermostat.

2 hours in thermostat.

The result is fixation of complement in the positive control (1, 2 and 3,) hemolysis in the negative controls, antigen controls and control without antigen and antibody (4 to 9), and no reaction in remaining controls in which the hemolytic system is incomplete (10, 11 and 12).

With each sample of the serum to be tested for antibodies three tubes are prepared as with the positive control, the reactions compared and a diagnosis made accordingly.

AGGLUTINATION TEST.

In the previous test the presence of antibody is determined by the *indirect* method of combining it with antigen in order to fix or deviate the complement and *prevent* the otherwise normal and visible phenomena of hemolysis. In the agglutination test as applied to dourine the antibody is determined by the *direct* method of combining it with antigen so as to *cause* the visible phenomena of agglutination, which, in the absence of antibody and under normal conditions would not take place. The latter test is very much simpler than the former in its application, re-

quiring in addition to the serum to be tested only one reagent but, nevertheless, the utmost care and precision in the details of performance. The all-important reagent is the antigen, which is prepared as already described for complement fixation excepting that a homogeneous emulsion of trypanosomes is used instead of the filtrate. Essential to success is the proper condition of this emulsion; if it is found, as is sometimes the case, that there is any spontaneous or auto-agglutination of the trypanosomes in the salt solution, which may be the result of taking the blood from the rats at too late a stage of infection and when the rats are in a more or less moribund condition, to delays in the course of its preparation, improper preservation, contamination, etc., the emulsion should be discarded as worthless. It is possible to preserve the trypanosomes in salt solution by storing on ice or by the addition of a small quantity of formaldehyde for a considerable time and still find it suitable for the agglutination test but it is advisable, whenever possible, to use a fresh emulsion and without a preservative.

In making the test one employs positive and negative controls which with the sera to be tested are treated exactly alike. Stock dilutions of each serum are made in the proportion of 1:20, 1:50, 1:100 and 1:1000 in normal salt solution, and from these a series of eleven dilutions are prepared in small narrow test tubes, each tube to contain one cubic centimeter of serum diluted as follows: 1/20, 1/50, 1/100, 1/200, 1/400, 1/800, 1/1000, 1/2000, 1/4000, 1/8000 and 1/10,000. A twelfth tube containing one cubic centimeter of salt solution only is added to the series. Unless the trypanosome emulsion has been just previously prepared it should be centrifuged, fresh salt solution substituted and the mixture thoroughly shaken to obtain the required homogeneous consistency. About two drops of the emulsion is then added to each tube of each series, after which each tube is separately well shaken commencing with the twelfth tube and following up to the first tube in each series; the whole are then placed in the thermostat for one to two hours at thirty-seven degrees centigrade or longer and the reactions or changes noted at half hour intervals.

The dourine or antibody—containing sera will agglutinate the trypanosomes in serum dilutions up to 1/2000, 1/4000, 1/8000, 1/10,000 and even in higher dilutions when strong in antibody; the reaction may be taken as positive when agglutination occurs

in dilutions to 1:1000; normal and non-specific sera will agglutinate not at all or only in the lesser dilutions of 1:20, or 1:50, perhaps very rarely at 1:100. The control tube containing only trypanosome emulsion and salt solution should of course be free from clumping otherwise there have been errors in preparation and the test must be repeated over again.

PRECIPITIN TEST.

The precipitin test, like the agglutination test, is a *direct* means of determining the presence of a specific antibody. Applied to dourine in the manner following it requires only two reagents—serum and antigen. For antigen trypanosomes prepared as for the agglutination test, are then placed with glass pearls in a flask and set in the shaking apparatus for two to three days. This fluid is then centrifuged, removed from the sediment and passed through a fine Berkefeld filter. Only an extract of trypanosomes obtained absolutely clear is of value for this precipitin test.

Five tenths of one cubic centimeter of the clear antigen is placed in each of a series of tubes and to each is then added an equal amount of the different sera to be tested—specific, normal and the unknown or suspected sera.—The serum is added to each tube by means of a fine capillary pipette the point of which is passed through the antigen fluid to rest upon the bottom of the tube and the serum then slowly released so as to push up the antigen fluid without mixing with it.

If the serum contains the antibody a thin white ring appears at the point of junction of serum and antigen in from ten to fifteen minutes or earlier.

The test is still more delicate if three tubes be taken for each serum, to tube one adding five-tenths of one cubic centimeter of pure serum, to tube two the same quantity of diluted serum 1:5, and to tube three serum diluted 1:10. In such dilutions the white ring is never shown by any but dourine sera and the reaction is quite specific.

The condition of the test is that both antigen and serum must be clear and fresh.

THE ACETIC ACID TEST.

This last is purely a chemical and quantitative test for the determination of an increased globulin content of blood-serum.

Noguchi*, in studying the serum reactions of syphilis, observed that the globulin fraction of the blood serum and cerebro-spinal fluid is increased in syphilitic conditions, and the increase of the globulin and the appearance of the antibody are often found associated together. He states further, that in the early stages of primary syphilis, when the presence of the antibody may not be detectable, the globulin content is seen already to be increased. He has worked out a test for syphilis using butyric acid as precipitant for globulin.

I have applied the butyric acid test for syphilis to dourine in a large number of cases and with many controls, later substituting acetic acid as the precipitant and devizing the method described as follows:

A centrifugal tube graduated to ten cubic centimeters is taken for each serum to be tested and for each known positive and negative control. One cubic centimeter of clear serum is placed in each tube and nine cubic centimeters of a half-saturated solution of ammonium sulphate added; each tube is then shaken and allowed to stand for one hour when they are placed in the centrifugal machine and centrifuged until the supernatant fluid has quited cleared and the globulin content is precipitated in a firm mass at the bottom. As much as possible of the upper fluid is then removed without disturbing the precipitate, to which is then added salt solution to make up the original volume of ten cubic centimeters in each tube, forming clear solutions of globulins.

In making the test each globulin solution is very carefully pipetted into five small test tubes in the following exact quantities:

One.	Two.	Three.	Four.	Five.
1.75 c.c.	1.50 c.c.	1.25 c.c.	1.00 c.c.	0.75 c.c.

to each of these is added sufficient salt solution to make up, when one cubic centimeter of ten per cent acetic acid has been further added, a total amount of three cubic centimeters in each tube. When each series of tubes has been prepared alike and shaken up they are placed in the thermostat at thirty-seven degree centigrade to thirty-nine degree centigrade for two to three hours; they may then be removed and the reactions read.

Normal sera will give at most a slight opalescence in tubes one and, possibly, a very faint bluish tinge in tubes two, the remain-

* The serum diagnosis of syphilis and the butyric acid test. H. Noguchi, —1910.

der staying clear even after several days. Dourine sera in a few hours will give a very marked cloudiness, which gradually becomes opaque, turbid, flocculent and finally precipitates after twenty-four hours or longer to the bottom, leaving a clear fluid above.

If more concentrated solutions are employed the reactions will occur quicker and more intensely but the differentiation is scarcely as clearly defined. The intensity of the reaction is in direct proportion to the amount of globulin present, constituting a positive or negative reaction—the former if in tube one there is turbidity or flocculence, the latter if it remains clear or is but slightly opalescent. A normal globulin content of blood serum does not give a positive acetic acid reaction. In very early stages of dourine the globulin content is increased and gives a positive reaction. A horse whose blood serum was negative to the test at the time of inoculation with dourine gave a positive reaction after fifteen days. Dourine horses give the reaction in any stage of the disease but in such cases as make a complete recovery the reaction gradually becomes less until, after many months, it is negative.

The acetic acid test is not an absolutely specific one for dourine, any more than the butyric acid test is specific for syphilis, but it probably has an even higher value in veterinary practice than the latter test in human diagnosis, for in horses we are scarcely likely to meet with any infection or pathologic condition other than dourine that will cause a positive reaction, though should we meet with such rare cases they could probably be differentiated according to the known history or clinical symptoms.

I have applied the test to cases of coital exanthema, glanders, influenza, fistulous withers and in a single case of swamp fever; only in the latter was a positive reaction obtained, the serum from this case was then used in the agglutination test for dourine and found quite negative. Perhaps the greatest value of the acetic acid test is in a negative reaction as excluding dourine infection, for in no case of dourine of known history has the reaction been other than positive. For the present, however, it seems advisable that when the acetic acid test is positive diagnosis should be controlled by one of the other tests.

The diagnosis of dourine is a matter of extreme importance and, so long as it is dependent upon clinical manifestations of

the disease, one of extreme difficulty and uncertainty, and, in many cases, impossible to arrive at.

In February, 1907, at Lethbridge, Alberta, the parasite of dourine—*Trypanosoma equiperdum*—was discovered for the first time on the American continent (by Watson & Gallivan) and a strain isolated and subsequently maintained up to this date by passing it from horse to horse by experimental inoculation. The large number of horses used in carrying on this strain in addition to many other animals found naturally infected, furnished excellent material for the study of the disease throughout the whole length of its chronic course and latent stages and, at the same time, the opportunity for the serologic investigation encouraged by Dr. Rutherford in the hope of determining a specific means of diagnosing latent dourine.

Again and again during the past five years while carrying on the experimental study of dourine at the Quarantine Station, Lethbridge, as well as in various outbreaks dealt with in the field, have I obtained proof that infections are not infrequently tolerated after a short period of unrecognized activity and further propagated by non-clinical carriers who have quickly acquired a resistance or a degree of immunity that may remain unbroken for a very lengthy period; furthermore, that dourine antibodies are present in determinable quantities in the very early stages of infection of horses as well as in the later stages, and that the serum diagnosis of dourine is possible, practical and reliable. Recently while working in the veterinary laboratories in Berlin on the complement fixation, agglutination and precipitin tests as employed by Professor Zwick and Dr. Winkler I was able to select dourine sera of Bulgarian infected horses and horses infected with the East Prussian strain, these sera being handed to me among other normal and nonspecific sera. I was also able to again identify them by the acetic acid test with which the German workers were not familiar.

In Western Canada we are now examining suspected dourine cases by the serologic method when a symptomatic diagnosis cannot be made; every month fresh proof is being obtained of the great value and reliability of these means of determining the existence of an infection by the positive serum reaction or in excluding infection by the negative reaction. Already there are cases on record in which a positive reaction to the serum tests during a suspected latent infection has been confirmed months

later by the development of clinical symptoms and by the finding of the specific trypanosome in the reacting animal.

Time and space will not permit me to give in this brief paper the figures and details of the many cases studied by serologic methods; these, however, will be submitted to the Veterinary Director-General of Canada for publication in his next Annual Report.

In conclusion I would say that the serum reactions of dourine as briefly outlined above have now become an important factor in the diagnosis and control of the disease in Western Canada and the outlook for stamping out infection is much more promising than it has ever been before.

I am indebted to Dr. F. Torrance, Veterinary Director-General, for permission to present this paper at this meeting.

DISCUSSION.

Dr. Knowles: I do not think it is profitable to attempt to discuss such a highly technical paper as that which Dr. Watson has given us, but I would like to state my appreciation of the work which he has done. It places the control of this disease on a very different footing. The clinical symptoms of this disease are often so obscure as to offer almost insuperable difficulties and obstacles in the way of successful diagnosis and treatment, but as the doctor has now called our attention to a new means of diagnosis it promises to help very materially in its control. I trust in the course of some years we will be able to eradicate this serious malady of the horse.

A Member: Mr. Chairman, Dr. Watson has spoken about these various methods of diagnosis, and I would like to ask at what time he succeeded in evolving these various methods of diagnosis. A man ought to have the credit of being first in a certain field of discovery, but it usually transpires that there are a number who are carrying on investigations in the same line, and it often comes to be a question of date as to when certain discoveries have been made. Dr. Watson has placed on the records by this paper a record of his investigations, but it may be that at the same time that this paper is being presented here other workers in the same field are publishing papers along the same line, and are getting the credit for them, and I would like to know for the benefit of the profession at about what date he worked these different methods out, so that any claim to any superiority to which he is entitled for his work in point of time may be understood.

The Chairman: If there are no others I will ask Dr. Watson to close the discussion.

Dr. Watson: In answer to the question as to the date and period in which these tests were worked out I would say that I think I mentioned in my paper that the work has been in progress for five years past, com-

mencing, in fact, shortly after I first succeeded in isolating and transmitting a strain of *trypanosoma equiperdum*, in February, 1907. Observing in some of the horses inoculated with this strain a marked tolerance and, in several cases, a rapidly acquired immunity to infection I began a long series of experiments with dourine sera ascertaining the presence of specific antibodies, agglutinins and precipitins. I believe this to be the first attempt made at the serum diagnosis of dourine of horses. This experimental work was pursued for three to four years and in the period of 1910-1911 I devised and worked out the acetic acid test (based on Noguchi's butyric acid test for syphilis) for the serum-globulin content of dourine sera. Owing to frequent interruptions in the work from the necessity of having to promptly deal with and control field outbreaks of the disease, the practical results of serum diagnosis and the formulating of reliable and constant methods have been slow in forthcoming. At first, as it always appears to the inexperienced worker, the technique involved in the serologic test appeared too difficult and complicated to be put to a practical use, besides which, other investigators were publishing from time to time unfavorable accounts of the serum diagnosis of trypanosome diseases. In 1911, however, several German workers, notably Zwick, Winkler and Lange solved the chief difficulty, namely, the preparation of a reliable antigen. Last winter I worked with Zwick and Winkler in Berlin, studying their technique with my own, and found their method of preparing trypanosomes for antigen—as described in this paper—superior to any other and having adopted it on my return to Canada in March, 1912, I have since employed it in a large number of tests with very satisfactory results.

*THE SERO-DIAGNOSIS OF GLANDERS.

By Dr. K. F. Meyer.

Philadelphia, Pennsylvania.

It is a well known fact that not all of the usual methods for the diagnosis of glanders have proven to be reliable. In past years veterinary science has to be credited with having tested all the available methods for the purpose of recognizing glanders. It is my intention today to show on a comparative basis the three tests which have an important standing in the sero-diagnosis of glanders. These methods have been tested over the entire world on a varying number of horses, and the results obtained by the different workers, together with the failures are shown in the table below. If the results obtained as stated in this table are correct, the most reliable of these tests must clearly be the complement fixation test, and before proceeding to discuss this test, the speaker would like to explain the position that veterinary science has to take in the question of diagnosing glanders.

Glanders as a disease of a contagious character affecting equines as well as human beings is, in most countries controlled by veterinary sanitary police laws. These laws can only be enforced when our methods provide against the possibility of overlooking those cases in which equines are affected with the chronic, occult type of the disease. Particularly this form of the disease has to be detected, because it always acts as a distributing agent for new outbreaks of glanders. Two qualifications are requisite for a test to be of diagnostic value.

(1.) All horses affected with the disease must be detected in the shortest possible time, particularly to prevent the carriers of the glanders bacilli, which most frequently are overlooked by clinical examination, from an opportunity to infect others and to complicate the subsequent tests.

(2.) Absolutely healthy horses must be protected by the method, instead of being unnecessarily sacrificed, as was undoubtedly the case with the old mallein test (agglutination test).

For many years the subcutaneous mallein test was thought to

*For discussion on glanders see page 463.

answer these requirements, but the last five years have shown its inefficiency. The old-fashioned guinea-pig test or Strauss-reaction is in the light of modern diagnosis entirely obsolete. Not only

the danger of sacrificing a high percentage of healthy and at the same time is prone to fail in detecting charac-

teristic glanders cases. I shall have further opportunity to point out the reason for these disadvantages when discussing the different tests. The results of our work in Pennsylvania have been collected for the last five months and are also shown in the table. The technique used will be discussed in the following paragraphs.

A. THE COMPLEMENT FIXATION TEST.

The complement fixation test was first used by DeHaan, and then worked out for practical purposes by Schütz and Schubert, Miessner and Trapp, and in this country by Mohler and Eichhorn. You are probably all familiar with the technique of this [illegible] I have therefore to add only a few remarks which in the [illegible]st years have proven to be of special value. The more sera we have tested in different parts of the world, the more we have become convinced that the mechanism of the antigen-antibody reaction is in glanders an absolutely specific but very intricate one. For the complement fixation test we always need the following substances:

(1.) Serum of the animal to be tested.

(2.) Glanders bacilli in form of an emulsion or in form of an extract.

(3.) Complement in form of fresh guinea-pig serum.

(4.) Hemolytic immune serum from a rabbit for sheep, goat or another animal blood.

(5.) Suspension of red blood corpuscles of a sheep, goat, etc.

As to the general technique I may say that the ingredients are mixed in such proportions that an entire bulk of five cubic centimeters results. This quantity has been used by Schütz and Schubert in applying the original Bordet and Gengou reaction to the glanders test. There is no objection to the practicability of this technique, only that in small laboratories the expenses of the glanders test run extremely high. Swen-Wall, using the complement fixation test for the diagnosis of contagious abortion, has changed the technique in using a hemolytic system which contains five times less blood corpuscles. On account of this change in technique a reduction of the quantity of the substances to be added, particularly the complement, will result, which enabled us to make with the serum of one guinea-pig a larger number of tests than with the original Schütz and Schubert technique. For the last four or five months we applied in conjunction with the ordinary routine technique (modified

Schütz and Schubert) this reduced form and obtained very satisfactory results, which facilitated the reading and the interpretation of the reactions. We intend to substitute the Schütz and Schubert technique by this method. For the apparatus of the test we can recommend the "test tube racks" of *Poppe* and the safety pipettes supplied by Altmann. The different substances used demand individual consideration and are therefore discussed separately.

(1.) THE SUSPECTED SERUM.

The serum is best obtained by withdrawing the blood from the jugular vein into sterile test tubes; removed from the clot and placed in small sterile tubes, the serum will for a long time retain the specific amboceptors. I do not like to call them immune bodies, as they probably are substances independently produced from the immune bodies. If collected sterile, protected from light, and kept at low temperature, after two months (especially when carbolic acid has been added) a diminution of the specific antibodies will be detected in the serum. Sera kept without preservatives retain their property to react for at least eight and a half months. The sera can also be dried without losing the antibodies. Nine-tenths gram dried serum are equal to ten cubic centimeters liquid serum. They are best dried in Petri dishes in a Heim's drying oven (Lautenschläger, Berlin). Decomposition has practically no influence on the antibodies; freezing and melting also have no influence on the reaction.

Before being used in the complement fixation test, the serum must in every instance be inactivated, that is to say, it must be heated to a temperature of fifty-eight degrees centigrade to sixty degrees centigrade; the serum should then be cooled quickly (cold water to avoid a specific precipitation [Fedders]). Schütz and Schubert, Miessner and Trapp, and the speaker have pointed out that this inactivation is absolutely necessary to obtain specific reactions, particularly when mule serum is to be tested. In many hundred tests, not only for glanders, but for other diseases, we have noticed that spontaneous deviation and nonspecific reactions occur when certain unknown substances in the serum have not been destroyed by heat. In examining samples of mule serum we have repeatedly found that a temperature of sixty degrees is not always sufficient and that a temperature of sixty-two degrees should, if possible, be applied to destroy the non-

specific bodies. In quantities of one cubic centimeter to five-tenths cubic centimeter the serum gives a spontaneous deviation, which means that certain nonspecific substances are present which deviate the complement. Aoki has called attention to the fact that in glandered horses in the course of the disease a gradual inhibition of the hemolysis takes place. This inhibition reaction runs parallel with the complement fixation only in cases of infection and not during the process of immunization. We are studying this feature more in detail. For the actual test it is best to follow the method of Schütz and Schubert and use descending doses of inactivated serum of four-tenths cubic centimeter to one-hundredth cubic centimeter. If specific antibodies are present complete fixation will, in eighty to ninety per cent of the cases, occur in the tubes which contain glanders bacilli and serum four-tenths cubic centimeter to five-hundredths cubic centimeter. Schütz and Schubert advised to carry out the complement fixation test with two-tenths cubic centimeter serum; Mohler and Eichhorn follow the same technique, but do not mention that in certain rare cases the specific antibodies are present in such small quantities, that a reaction may only be obtained with four-tenths cubic centimeter serum. Miessner in his latest publication strongly points out that a specific reaction with four-tenths cubic centimeter serum in a stable where glandered horses have been detected, has a diagnostic value; while on the other hand in stables with healthy horses a reaction of four-tenths cubic centimeter serum may be interpreted as negative. In our studies on glanders we have lately made similar observations, and advise therefore the workers with the complement fixation test not to interpret the results too mechanically. To give an example of this fact I cite the test of horse (Rabbit). This animal reacted to the subcutaneous mallein test, several times very distinctly to the ophthalmic mallein test and gave an agglutination reaction one to one thousand five hundred. With two-tenths serum no complement fixation was obtained. The serum was retested with four-tenths and five-tenths cubic centimeter serum and a distinct reaction with perfectly clear controls was recorded.

Schütz and Schubert, Miessner and Trapp, Müller, Gaehtgens and Aoki and the speaker, have demonstrated that the specific complement-binding amboceptor appears six to ten days after the infection and increases gradually to a maximum, so that on the eleventh day or twelfth day a complete fixation is present,

in a dilution of one-hundredths cubic centimeter serum. After a certain time, which in horses may vary considerably, a condition arises which is particularly influenced by the length of the glanders infection, and partially by the degree of the glanders process, a condition which Schütz discusses in his latest paper under the name of "Antimallein production." Under the influence of the mallein in a glanders process varying quantities of antimallein are produced. If this antimallein is present in large amounts the inoculated mallein will be made inactive and the complement as a ferment cannot reduce the mallein to toxic intermediary products which would then not cause the febrile reaction. As soon as the antimallein is used up the anaphlactic condition of the animal body is changed to an antianaphlactic one and reinjection of "mallein" will in the next few days cause no febrile reaction whatever. There are undoubtedly chronic glandered cases in which there is no possibility whatever of demonstrating specific antibodies.

Miessner and Trapp found that mallein injections into healthy horses produce, after an incubation period of five to ten days specific antibodies in the serum. These antibodies disappear only about three to four weeks after the injection. It would therefore be advisable not to test animals with the mallein before the serum has been collected for the tests. The high percentage of failures obtained by me and shown in the table is largely due to the effects of the mallein tests. At least three and a half to four weeks should elapse before blood samples are again collected for serum tests. The ophthalmic mallein test has occasionally a slight influence on the binding value of the serum, but the influence is only noticeable in actually affected glandered horses.

Under normal conditions the serum of healthy horses gives a fixation only with higher quantities of serum. Schütz and Schubert alone found about seven animals out of three thousand which reacted positively to the complement fixation test. It is interesting to note, that all the later publications on the same subject, particularly those of Dedjulin on two hundred and forty-five horses, have shown that in a fairly large number of healthy animals no failures have been recorded. If such failures were found, as they occurred to me during the past years, it was frequently observed that such horses had been tested with mallein before the serum was collected, or that such animals were actually affected with glanders, and that the superficial post-

mortem examination did not demonstrate the glanders lesions. My views are here supported by the publications of Miessner. I do not think it possible that the complement fixation test will give positive reactions, if the animal has not in one way or the other been exposed to the proteins of the glanders bacillus. The serum of such animals as are not suffering from glanders never gives specific fixation of the complement. This refers particularly to the diseases which have clinical similarities with glanders, namely sporotrichosis and "epizootic lymphangitis." For sporotrichosis the complement fixation test can be used with the same success, when instead of the glanders bacillus an emulsion of the spores of sporothrix Beurmanni is used. Animals affected with piroplasmosis or icterus may occasionally deviate the complement nonspecifically. The serum of cats and guinea-pigs affected with glanders also gives a specific complement fixation, when such animals actually have passed or succumbed to a glanders infection.

(2.) ANTIGEN.

Through the experiments of Schütz and Schubert, Miessner and Trapp, et al. it was shown that the most suitable antigens are obtained by using an extract of glanders bacilli. We are growing the glanders bacilli on glycerin-potato agar (Nicolle), also on simple potato agar. Every three months the bacilli are passed through cats and guinea-pigs. We shake the emulsions of glanders bacilli six to eight days and use the clear supernatant fluid in a dilution from one to one hundred to two hundred. Such extracts should only be used after standing eight days in the ice-chest. Mallein (Foth one to ten to one to one hundred) or one per cent antiformin extracts gave very varying and unreliable results. For the last four months we used, as recommended by the Russian investigators Shirnoff, Maskalowetz, Dedjulin, et al. bacterial emulsions of the glanders bacilli. The emulsions used for the agglutination test give the required results in a dilution of one to five hundred to one thousand. Frequently I become convinced that the results are more satisfactory than with the extracts. These emulsions are then compared with extracts which remain potent about three months; when kept cool and protected from light they are only active about sixteen to twenty days. The technique of Schütz and Schubert with emulsions is to be highly recommended as such preparations are

ready in every laboratory making a great number of agglutination tests. Organ extracts or artificial extracts in form of lipoid emulsions of glandered horses will rarely give specific reactions and can therefore not be recommended.

(3.) THE COMPLEMENT.

Guinea-pigs are the most suitable complement-supplying animals for the fixation test. Schütz and Schubert pointed out that one should take the smallest quantity of complement which, with the standard solution (double) of hemolytic serum will dissolve a five per cent solution of red blood corpuscles. We conducted many experiments with the one and one-half multiple of the tested complement quantity and obtained very good results, but here I recommend the complement only to be used in the really smallest efficient quantity. Only titrated guinea-pig serum, protected from light in the "Frigo" apparatus, should be used on one and the same day.

(4.) HEMOLYSIN. (SHEEP OR GOAT HEMOLYSIN.)

Rabbits inoculated intraperitoneally produce the best hemolysin (at least twelve animals should be inoculated at the same time). Inactivated for use at fifty-six degrees centigrade preserved with five-tenths per cent carbolic acid, or better in dried condition, these antibodies will keep for at least six to eight months. All hemolytic sera should be tested every eight or ten days as the amount of the hemolytic amboceptors is apt to increase gradually in the rabbit serum. For the test the double amount of the titre has to be used. If in the titre test seventy-five thousandths serum in one hundred cubic centimeters saline produces absolute hemolysis with five-hundredth cubic centimeter complement use for the complement fixation test fifteen-hundredths cubic centimeter. The titre of the hemolysin should be at least one to one thousand five hundred to two thousand. To save expense we take for the titration instead of one-tenth complement, only five-hundredths cubic centimeter complement.

(5.) THE ERYTHROCYTES.

The blood corpuscles have to be washed most carefully five or six times and should always be titrated with a standard hemolysin and five-hundredths complement (Miessner and Trapp), as

there are great differences in the hemolytic properties of the blood corpuscles of different individuals. We used until recently a four to five per cent solution, lately also a two and five-tenths per cent solution, and now many tests are made with a one per cent solution. Results with the latter are very satisfactory. All advices to use preserved corpuscle solution (formalin, etc.) cannot be supported. We use, if possible, only absolutely fresh corpuscles, very rarely three day old corpuscles, if the suspension does not show signs of hemolysis.

In our laboratory, on account of the large number of tests, the actual test is made in two steps. First we test each horse serum in the quantity of three-tenths serum. Should this serum give a reaction, we retest the same in descending doses, two-tenths, one-tenth, five-hundredths, two-hundredths, one-hundredth, to obtain what is called the "binding value." (Miessner and Trapp). Controls for the extract or bacilli emulsion, the serum alone, the serum complement, the serum amboceptor, the hemolytic system, etc., with a control of a known healthy and a diseased horse have to be added. A test without controls has no value. Publications on the complement fixation test in which all controls mentioned are not shown, should speedily be thrown into the waste basket, as they do not amount to anything.

The results of our test are noted after being kept two hours in the incubator at thirty-seven degrees centigrade and twelve hours in the ice chest.

Interpretation of the results: Horses, giving a reaction of one-tenth and lower are to be considered as being affected with glanders. A "binding" value of two-tenths with an agglutination reaction of less than one to one-thousandth are suspicious for glanders. I refer here to my detailed publication on this subject. All the investigators (during the last two years) have shown that one hundred per cent positive reactions are obtained in glanders as well as in healthy animals. According to Müller, Gaehtgens and Aoki the complement fixation is unreliable for an early diagnosis of the disease, when in a state of incubation. Only in the second week of the course of the disease an absolute indisputable diagnosis can be given with the complement fixation test. Our experience with nearly six thousand serum tests of about five thousand equines has confirmed these observations and results, *and therefore the complement fixation test as a laboratory test is the test of the future.*

B. THE AGGLUTINATION TEST.

This test was used in our laboratory only for a control of the progress and duration of the glanders infection in the tested animals. Unless accompanied by a reliable test this sero-diagnostic method cannot be recommended. If we take into consideration that there is no standard figure as to the amount of agglutinines in a healthy and in a glandered horse, one test alone will with a few exceptions never permit a final diagnosis. But if retests have to be made ample opportunities for the spreading of the disease in a stable are given. When in my table the figure one to eight hundred is considered a positive reaction, I owe the assembly an explanation. From our experience we deduce that in ninety-nine per cent of the cases healthy horses have an agglutination titre below one to eight hundred. Still a fixed value cannot be given and the figure given is therefore only selected for statistical purposes. Schütz and Miessner stated that a titre below one to three hundred is an indication that the horse is free from glanders. Sustmann considers the titre one to five hundred as the limit for non-specific agglutination. All the observations of the past years have shown instead, that it is impossible to fix a lower and upper limit and that only the fluctuations of the agglutination titre in intervals from twelve to fourteen days are of diagnostic value. That during this time *no malleinization should take place is self evident.* Chronic glanders cases cannot be detected with the agglutination test alone, only when reinfection and a dissemination of the glanders bacilli has taken place and fluctuations of the agglutination titre are noted. The results obtained in the test are noted in the table in circulation. Heterogeneous diseases like strangles, pleuropneumonia, septicemia, influenza, have practically no influence on the titre; positive results noted by different laboratories can be explained as the expressions of a high individual percentage of normal agglutinines (compare the results and explanations of Schütz). The technique most commonly used is that of Schütz and Miessner; for certain scientific investigations that of Müller, Gaehtgens and Aoki has undoubtedly great advantages. The serum without preservatives is usually diluted one to forty. Schütz found that five-tenths per cent carbolic acid does not for a short period change the quality of agglutinines (over one-half year.) The dilution of one to forty should always be made immediately be-

fore the test is carried out, otherwise paradox agglutination in the sense of Eisenberg, (Sustmann and Meyer) may be observed. The test fluid is prepared from selected glanders strain grown on acid potato agar (48 hours). The glanders strain never loses its agglutinating properties when supplanted every sixteenth day on glycerin agar and passed through a cat every six months; the passage through animals has no influence on the agglutin ability. The cultures are washed off with saline solution and the suspension killed at sixty degrees centigrade for two hours, or at ninety-nine degrees centigrade for one-half hour. The latter method (Schnürer) can be recommended. When cool, the suspension is shaken with glassbeads, diluted up to a certain density and filtered. To test the density we used with success Fäser's lactodensimeter recommended by Schnürer. Naturally only a certain training will ensure approximate uniformity in the preparation of suspension of equal density. Every suspension has to be compared with a standard suspension and with at least two to three sera before being used, otherwise irregular results as shown in tables of Sustmann's publications are obtained. The test tubes containing two cubic centimeters fluid are incubated for twenty-four hours at thirty-seven degrees centigrade and then twelve to fourteen hours at room temperature; only in this manner distinct results will be noted. We usually prepare for an orientation test five dilutions: one to two hundred, one to four hundred, one to six hundred, one to eight hundred, one to one thousand. For complete investigation we use dilutions from one to one hundred and one to sixteen thousand. All other methods, particularly those which aim to enable the practitioner to carry out the test in the field cannot be recommended. We now have mallein tests which can assist the practitioner in the diagnosis of the disease, but the agglutination test necessitates the working outfit of a laboratory. Frequently we employ the process of centrifuging the tests according to the method of Müller, Pfeiler, etc. The dilutions are made up in small tubes and centrifuged in an apparatus as shown in the picture in circulation. The number of revolutions and the diameter of the centrifuge axis is of importance. The results are very satisfactory but for a large number of tests not convenient, so long as there is no large centrifuge for several hundred tubes at hand.

C. THE PRECIPITATION TEST.

The first attempts to diagnose glanders by means of the precipitation test were made by Dedjulin, Wladmiroff, Shirnoff, etc., but the results obtained were unsatisfactory. Pfeiler and then Miessner changed the technique in using Ascoli's stratification method for precipitation. The technique used by Pfeiler is complicated, but in my opinion is the most reliable one. The antigen is prepared in washing of the killed glanders bacilli with carbolized horse serum, and is kept for three days at thirty-seven degrees centigrade, then filtered through fresh "Reichel" or Chamberland candles. The extracts are to be used only in a certain concentration, therefore being diluted before use with six to twelve times fresh horse serum. To make this test-fluid lighter in specific gravity, one part extract is diluted with one part saline solution. For the actual test two tubes are necessary: I. One with the suspected serum and the extract. II. One with the suspected serum and saline and the horse serum used for dilution. A cloudy ring will appear at the point of contact of the two fluids, in five to twenty minutes. Three to four controls of all the substances used with the serum of healthy and glandered horses have to be prepared simultaneously with the test. The fluid bulks we usually work with were three-tenths to five-tenths cubic centimeter of serum and extract.

The method of Miessner in stratifying twenty-five thousandth gram mallein, dry (Foth) dissolved in ten cubic centimeters saline solution on the suspected serum, kept at thirty-seven degrees centigrade for two hours, is much more simple, but the results are not uniform. Stronger concentrations of the mallein also give reaction with normal sera. In this technique the cloudy ring is usually distinct.

The method of Koneff using as antigen "antiformin extracts" of the glanders bacilli or the so called "Mallease" has been tested in our laboratory, but was found to give in many healthy horses very doubtful reactions, which were difficult to interpret, and was therefore substituted by Pfeiler's methods. *Particularly the individual interpretation deprives the precipitation test of any great diagnostic value.* We tested lately one hundred sera, not specially selected but constantly controlled by the complement fixation, agglutination and local mallein tests, and found that about sixteen per cent of healthy horses gave a reaction which had to

be considered as glanders; of ten sera of glandered horses, nine gave a positive reaction, but this number of horses tested is undoubtedly too small, and if I compare the results which I had with this test in South Africa, where only about seventy-five per cent of one hundred and twenty glandered horses were diagnosed without hesitation, I am sure that the results of Fitch are correct, *that only about eighty or ninety per cent of glandered cases can be detected. The precipitation method cannot be recommended as a laboratory test for glanders.*

GENERAL CONCLUSION.

From our experiences during the last four years and particularly those collected during the last five months in Pennsylvania we conclude that the complement fixation test is the most reliable method for confirmation of clinical symptoms and the detection of occult latent glanders. Comparing it with the ophthalmic test, we found that this method is undoubtedly superior to the subcutaneous test, and, on account of its simplicity of technique allows a quick and reliable determination of the extent of a glanders outbreak, isolation of the diseased animals and protection of the healthy ones. The ophthalmic test, therefore, in conjunction with two laboratory tests, will be the method, which in the hands of the practitioner will give the most reliable results for the eradication of glanders. The two tests to be selected should be the complement fixation test and the agglutination test.

I herewith propose to the members of the American Veterinary Medical Association to appoint a national committee for the purpose of studying all the methods of diagnosing glanders, with the aim to reach an interstate understanding for handling of this disease in equines.

*THE MALLEIN TESTS.

By C. J. Marshall,

Philadelphia, Pennsylvania.

The Pennsylvania state officials began using mallein subcutaneously as a diagnostic agent for glanders in 1894. From that time to January 1, 1912, the records show that this test has been applied to six thousand, three hundred and three (6,303) horses and mules. During the same period one thousand and thirty-three horses and mules have been destroyed on account of glanders. It has never been the policy of the board to insist on destroying animals for glanders unless physical symptoms of the disease were present. All susceptible, exposed cases were placed in quarantine and kept there until the open cases have been destroyed or safely isolated, reactors only destroyed or passed a satisfactory retest and the stables and other sources of infection have been disinfected.

It was believed to be unnecessary and unsafe in cases with well marked physical symptoms of glanders for the average veterinarian to conduct an autopsy. For these reasons we have but few post-mortem records until subsequent to January, 1912.

A veterinarian is required by law to report to the board all cases of glanders coming under his observation. Agents for the society for the prevention of cruelty to animals report a good many cases. In some places the board has made them agents and given them authority to quarantine suspected cases till a qualified agent can be gotten to make a diagnosis.

When a qualified, recognized veterinarian reports a case of glanders on a physical examination his diagnosis is accepted. He is then authorized to appraise and destroy the animal, place all exposed, susceptible animals in quarantine and arrange to make a physical examination and apply a thermic mallein test as soon as possible to each animal in quarantine. Those that react positively may be appraised and destroyed or placed in strict quarantine. Those that show a doubtful reaction are placed in provisional quarantine and retested in from one to two months. They

*For discussion on Glanders see page 463.

are subsequently dealt with as reactors or released according to the results of the tests. Animals that have passed the test are not allowed to be sold for three months from the time the last positive evidence is removed, or until they have passed the eye or serum tests. In a very few cases mallein has failed to give a characteristic reaction where it was known that the animal had glanders, and on the other hand well marked reactions have been obtained on the first test, the animal satisfactorily passing subsequent tests and showing no evidences of glanders for several years thereafter.

A characteristic reaction is understood to be one in which there is high temperature, painful swelling at point of injection and physical depression. In the experience of the writer this combination is seldom found, being the exception, not the rule. With it results are positive, easily interpreted, and a mistake will seldom be made by destroying an animal that has given such a reaction. Partial reactions are most common and they are not easily interpreted in all cases even by those who have had a wide experience in using mallein.

Veterinarians as a rule in Pennsylvania have unlimited faith in the accuracy of tuberculin as a diagnostic agent for tuberculosis and they seldom misinterpret the results of a tuberculin test. This is not true in reference to mallein.

Dr. M. Klimmer reports the recommendations made at the international veterinary congress, held in Budapest in 1905, in reference to the thermal mallein test. This may be found in his hand book on serum therapy and serum diagnosis, Veterinary Medicine Volume II., page 310 of the 1911 edition. Some facts are noted in reference to temperature, local swelling, etc., in typical and atypical reactions, and conditions are mentioned where atypical reactions may be expected. They are as follows:

The typical glanders temperature is 104 degrees Fahrenheit. It should rise gradually, remain high till the second day and then fall gradually. With such a temperature glanders should be diagnosed whether there is swelling or not at the point of injection. An atypical reaction may be lower or higher than 104 degrees Fahrenheit. A swelling at the point of injection six inches by six inches is considered typical and glanders should be diagnosed irrespective of temperature. A renewed rise in temperature on the second or third day after injection should be considered positive. In all cases a retest should be applied in from ten to twenty

days. Plain mallein or retest mallein may be used for this purpose.

The following conditions may produce atypical reactions:

(1.) Spoiled or badly prepared mallein.

(2.) Carelessness or inefficiency on the part of the operator.

(3.) Advanced cases of glanders. (Physicial diagnosis is usually easy in such cases.)

(4.) Marked emaciation from any cause.

(5.) Exhaustion.

(6.) Advanced age.

(7.) When antipyreties have been given.

In retests or where too small a dose of mallein has been used one is more liable to get a typical swelling than a typical thermal reaction.

Dr. Klimmer also reports the results of his personal investigations on four thousand, seven hundred and eight (4,708) horses submitted to the thermal mallein test. Of this number three thousand and forty-nine reacted and one thousand, six hundred and fifty-nine passed the test. All these animals were killed and carefully posted. Of the three thousand and forty-nine horses condemned no lesions were found in two hundred and seventy-two. In the one thousand, six hundred and fifty-nine animals, which passed the test eight had lesions of glanders. According to these figures for every twelve horses that react to the mallein one may be considered free from glanders. For those that pass a mallein test over two hundred might be killed before one would be found that showed the disease.

The results in Pennsylvania in the opinion of the writer would justify the above conclusions. Few glandered horses will escape the thermic mallein test. With this test there is much more danger of killing those that are free from glanders. For this reason horses that react to the thermic mallein test, but show no suspicious physical symptoms should furnish additional proof that they have glanders before one is justified in destroying them. The ocular mallein test is very useful in such cases, those reacting to this test may be destroyed safely. It is considered best, however, to hold all reactors for at least two weeks and collect samples of blood from each case for the serum tests and then submit them to a thermic mallein retest. Those that react a second time or have reacted to the eye, or either serum test, should be considered glandered and dealt with accordingly.

In acute glanders and other febrile diseases mallein should not be used subcutaneously on account of high temperature. It is less reliable in retests than in the original. There are numerous cases where other methods for diagnosing glanders must be resorted to if accurate results are to be obtained. Our board is fortunate in having recource to the various laboratory forms of diagnosis. The laboratory furnishes indispensable service in this line. Aside from preparing mallein for the subcutaneous and ocular tests diagnostic inoculations are made and the agglutination, complement fixation and precipitation tests are carried out. The board and the profession at large have unlimited faith in the laboratory report. Diagnostic inoculations are not satisfactory at all times for the reason that the animal frequently dies from some other disease. When a diagnosis has been established by this method it is considered most positive.

Our laboratory began using the agglutination test about 1908. Results were irregular and apparently fickle. Very little confidence has been established for this method of diagnosis from a practical point of view. In the past few months the results have been much better and at present we have an abundance of confidence in the agglutination and the complement fixation tests.

While we have met with disappointments in the use of mallein we still believe that it is the most practical method for diagnosing glanders that is known at the present time. The various other methods are especially useful in assisting to establish a diagnosis, and most useful in preventing the destruction of those that are free from glanders, when mallein cannot be used or when it fails to give a characteristic reaction.

About the first of the present year we began experimenting with a specially prepared mallein used in the eye. We have records of the ocular test on two hundred and one cases (fifty-three positive of glanders). It has been used in well marked physical cases of glanders, exposed and healthy animals, and results have been uniformally satisfactory. Like mallein used subcutaneously the original test is the most satisfactory. In some cases a slight thermal reaction is obtained, which is of diagnostic value. Where a subcutaneous test is applied in positive glanders subsequent to an ocular test the eye will sometimes react. The ocular test is easily applied and readily interpreted. The elevated initial temperature does not appear to interfere with results.

The following instructions are sent to practitioners in Pennsylvania for applying an ocular mallein test:

GLANDERS.

Scientific Principle: The animal body infected with glanders is hypersensitive to mallein to such a degree that this preparation given in small doses will cause at the seat of the application an inflammatory reaction; in large doses general symptoms, (fever, or the well known mallein reaction). The hypersensitiveness occurs under general conditions at the end of the third week after infection and reaches in the first month of the disease its maximum. (During the further development of the disease in from six months to two years it generally sinks down to the insensibility of healthy animals.) During this period conditions of increased sensitiveness may be detected.

Technique of the test: The mallein (five per cent solution of dry mallein ("Foth") in saline solution is instilled into the conjunctival sac of the eye (quantity two drops). A fine camel's hair brush can be used. The other eye serves as a control.

Course and interpretation of the reaction: Immediately after the application, in practically all animals, lachrymation, reddening of the conjunctival membranes, photophobia, etc., will be noted. This primary reaction is *not* specific and disappears in the next few hours. The specific reaction begins five to six hours after the application and has a duration of thirty-six to forty-eight hours, occasionally longer. The symptoms are a purulent conjunctivitis, reddening, swelling and purulent secretion. *The purulent secretion is typical.* Distinguish the following:

a. Positive reaction: Purulent secretion in varying quantities; in small quantities always to be found in the inner canthus.

b. Negative reaction: Absence of any secretion.

c. Doubtful reaction: Slimy secretion of lachrymation after twenty-four hours.

The examination is made as early as twelve hours and as late as twenty-four hours after the application. A positive reaction indicates glanders. One negative test does not permit the elimination of suspicion, but after three weeks repeated ophthalmic tests with negative results speaks against the presence of the disease in the animal tested.

Doubtful reactions support suspicion. In these cases a repeti-

tion of the test is recommended. The second test can be carried out in from one to thirty days. In this case a positive reaction supports the diagnosis of glanders. (Should the second test be negative or doubtful, a third test should be applied in three weeks.)

Fever and general symptoms: Severe positive ophthalmic reactions run their course without fever and general symptoms. Latent infected animals are hypersensitive to such a degree that traces of mallein absorbed by the circulation cause a febrile reaction. It is therefore advisable to combine the ophthalmic test with a temperature test. Three temperatures are necessary—one at the time of the application and one at the time of each observation.

A doubtful ocular reaction can, by the simultaneous rise of temperature from a non-febrile state of the animal, be interpreted as positive.

Sources of mistakes: (a) The ophthalmic test should not be applied in cases of an existing conjunctivitis.

(b.) By removing the purulent secretion (by manipulation of the stable man) a positive reaction may become indistinct. Usually in these cases, a purulent secretion is found surrounding the eye.

(c.) A positive reaction may be simulated by a voluntary or involuntary irritation of the eye, (foreign bodies, etc.).

(d.) In rare cases the reaction may be *atypical.* It may appear suddenly and disappear in a few hours or later and could not be detected till twenty-four hours or later. Both reactions are to be interpreted as "doubtful."

(e.) In rare cases the untested eye reacts.

(f.) There exists no correlation between the degree of the reaction and the degree of the pathologic lesions.

The ocular mallein test conflicts in no way with the subcutaneous test.

NOTE: Mark the reactions as follows: p, positive, with figures 1, 2, 3 as to degree of pus; 1, little; 2, much; 3, abundant; N, negative; D, doubtful.

The ocular test is convenient and useful in stables where glanders is suspected or in an animal giving suspicious symptoms. If a serum test is to be made the blood should be obtained before or not for three to four weeks after mallein is injected. The ocular test may be used before or after the subcutaneous test. It

is not considered advisable to use the two at the same time because during a febrile reaction the ocular reaction fades away.

Those that react to an ocular test and show suspicious physical symptoms may be appraised and destroyed at once or placed in rigid quarantine. Animals that react to the ocular test but show no physical symptoms should be isolated, sample of blood obtained and a subcutaneous mallein test applied as soon as possible. If the ocular reaction is confirmed by a reaction to the subcutaneous test or either of the sera tests the animal should be considered glandered and dealt with accordingly.

Animals that are condemned for glanders by any test yet show no physical symptoms of the disease should be submitted to a careful post-mortem examination. This has been done in Pennsylvania since January 1, 1912. There are very few owners who have sufficient faith in any test and especially so if there are no physical symptoms present. The no symptom cases must be gotten rid of if glanders is to be eliminated. There is very little chance for mistakes if the known diagnostic agents are carefully and intelligently used.

*GLANDERS VACCINE.

By R. S. MacKellar,

New York City, New York.

The use of glanders vaccine as an immunizing agent was first begun in New York City during the summer of 1907.

In a paper entitled "The Diagnosis of Glanders in the Human Subject from the Viewpoint of a Veterinarian," by Dr. A. Silkman, Veterinarian, New York City department of health, read at the February meeting of the Veterinary Medical Association of New York City and subsequently published in the American Veterinary Review of June, 1907, also in the Medical Record of October 5th, 1907, Dr. Silkman advocates that a special preparation of mallein might be of assistance in combating the dread scourge of glanders.

Working along these lines, with the assistance of the research laboratory, department of health, New York City, a glanders vaccine was prepared in the following manner:

Bacillus mallei is inoculated upon three glycerin potato agar tubes, and allowed to grow at incubator temperature (thirty-seven degrees centigrade) for twenty-four hours. To each tube is then added two cubic centimeters of sterile, physiologic salt solution and the surface growth is made into a suspension by rubbing up with the salt solution by means of a strong platinum wire. The suspension from the three tubes is added to a flask containing five hundred cubic centimeters of sterile nutrient broth. The inoculated flask is incubated for seventy-two hours. At the end of this time the flask is removed from the incubator and the culture is tested for purity. If a pure culture the flask is placed in water bath and gradually brought up to seventy degrees centigrade, and held at that temperature for two hours. After the heating is completed and the material is tested for sterility by making inoculations upon glycerin potato agar, and incubating at thirty-seven degrees centigrade for about forty-eight hours. If sterile add fifty cubic centimeters of a five per cent solution of carbolic acid to the five hundred cubic centimeters of the vaccine

* For discussion on Glanders see page 463.

to prevent infection. Then the vaccine is ready for bottling. The bacterial count is one hundred million bacteria per cubic centimeter.

This vaccine is inoculated subcutaneously in three separated doses, one week apart, under aseptic precautions, viz: clipping the hair and washing point of inoculation with a five per cent carbolic or a one to one thousand bichloride solution.

The first injection consists of one cubic centimeter, the second two and one-half cubic centimeters, and the third, five cubic centimeters of the vaccine.

In some animals a marked thermic and local reaction occurs, lasting for several days. The local reaction in these cases is usually a large edematous swelling which in a few instances has exuded a serous exudate. These cases, however, are rare and it has been our experience that not over one or two per cent of the animals inoculated are incapacitated for continuing their regular work.

The first stable in which we applied the vaccine was one containing one hundred and fifty head of draught animals. Glanders developed in this stable and fourteen head were condemned and destroyed on physical symptoms and the mallein test.

The agglutination test of the remaining one hundred and thirty-six head resulted in seventy-seven showing a reading of one thousand and up to ten thousand.

The vaccine was then administered with the result that two or three animals very soon, after the first injection, developed a negative phase, and presented physical symptoms of glanders and were destroyed. We find that in some cases where the glanders lesions are in an advanced stage the use of the vaccine will produce a negative phase followed quickly by development of physical symptoms.

The animals remaining in this stable were subjected to the vaccine treatment six months later, and again in six months from the second treatment. None of these animals treated in this manner have developed glanders up to the present time.

A grey gelding recently purchased from another firm in June of this year (1912) developed a clinical case of glanders and was destroyed. The owners of this establishment were so favorably impressed with the previous result of the vaccine treatment that they requested it be used again.

This was immediately done during the month of July and up

to the present time no further cases have developed. In another large brewery stable, fourteen head of horses were destroyed on physical symptoms, and the mallein test during the winter of 1907 to 1908. Eighty-one horses were subjected to the agglutination test and forty-nine gave a reading of one thousand and up to ten thousand.

At the time the proprietors requested that a consultation be held, which was done and consisted of the attending veterinarians, the department of health veterinarian and two prominent practitioners of New York City. Each and every animal was given a rigid physical examination and at the suggestion of the consulting veterinarians, a few showing slight physical symptoms were quarantined in a small stable set aside for that purpose. All of the animals were given the vaccine as in the first stable mentioned above with results very similar. Three breaking down after the first or second injection of the vaccine.

Among those quarantined a pair of roan geldings proved to be very interesting cases. On physical examination the submaxilliary glands were found to be very much enlarged, and several of the lymphatics prominent and carrying a temperature prohibitive of the mallein test. The agglutination reading of each was ten thousand. These animals were carefully watched and in addition to their regular doses of vaccine were given seven additional doses of five cubic centimeters at regular intervals. Their temperature ranged from one hundred degrees to one hundred and six degrees Fahrenheit for over three months, when it finally became normal. They were kept in quarantine for about eight months, at the end of which time all symptoms having abated, they were returned to the main stable. These two geldings are alive and performing their regular work at the present time, after a period of four years.

This stable was also re-inoculated six months later and the results have been very satisfactory. Not a single case has developed since. In another stable of seventy head an outbreak occurred which resulted in the loss of several animals, and, worse than all, the death of the veterinarian who was then in attendance and contracted the disease.

The same methods were pursued in this stable as in the two previously mentioned, with the result that not a case has developed in nearly four years.

This course has been pursued in a large number of other stables,

and in nearly all instances with gratifying results. The above cited will tend to give an idea of the method of procedure.

In animals giving a pronounced thermic and local reaction, we have found it advisable to make a few additional injections of the vaccine until a permanent positive phase has been established.

The general improvement in the physical condition of animals after the vaccine treatment is decidedly marked. The coat becomes smooth and they as a rule gain in weight. One owner remarked "that it acted better than any tonic he had ever used."

It is undoubtedly true that a horse may give a positive agglutination reading and still not give a mallein reaction. We believe this also to be true of the complement fixation test. This seems to be due to the fact that the glanders bacilli is present in the system but no active lesions. The question now comes up, "has the horse enough natural immunity to overcome the infection?" By the use of the glanders vaccine the opsonins are increased and aided in overcoming the infection. Just what action the vaccine has on the blood is not known, except that it increases the opsonins and antibodies.

Mallein itself will give a small amount of immunization, but nothing to compare with the vaccine containing the dead organisms.

The question has been raised, viz: "If a horse was vaccinated with glanders vaccine in New York City and said horse be shipped to Philadelphia and should there show symptoms of glanders, and the owner would send a sample of the blood to any laboratory to be tested by the agglutination method or the complement fixation test, what would happen?"

In answer to this we quote Dr. A. Silkman, who states that "Personally I would say that a certificate should go with the horse stating that he had been vaccinated, the date, and by whom. The vaccine will undoubtedly interfere with either of the above tests. The mallein test would be the only one to rely on. Some claim that a horse will give a mallein reaction after the use of vaccine. This has not been my experience. A horse having received as high as thirty cubic centimeters of glanders vaccine, as a dose, did not give any mallein reaction."

"The post-mortem finding in horses following the use of vaccine are quite interesting. There is quite a marked change in the appearance of the lesions and it also appears that they are becoming encapsulated."

Quoting from the last report of the New York State Veterinary College, in reference to glanders, it is stated that "This disease seems to be spreading quite rapidly in the state. The steady increase in the spread of glanders should be a warning to all veterinarians who should be constantly on their guard for this most serious of diseases of the horse kind."

This indicates that the methods of control and eradication, which now obtain are insufficient to even prevent the spread of the disease, far less its extermination. It would therefore appear that some measures such as have been recited in this article may, and probably without any doubt would, help to change this to be regretted condition.

During February, 1911, Dr. A. Silkman, under the direction of Dr. William H. Park, director of research laboratory, New York City, started a horse on glanders vaccine in an effort to produce a highly immunizing serum. The results up to the present time have been highly gratifying.

Any veterinarian desiring the vaccine to give it a trial can have it by sending their name and address to Dr. W. H. Park, director of laboratories, department of health, New York City (foot of East Sixteenth street).

It may not be within the province of this article to suggest any other methods for the control of glanders, but we cannot refrain from expressing the opinion that, if a more extended inspection of all stables, especially those in the large cities, were made, all diseased animals promptly destroyed, quarantine stables established where those of a doubtful nature could be safely kept for observation, and all others immunized by the use of glanders vaccine, it would soon result in the control and ultimate eradication of this scourge.

In the preparation of this article, we wish to acknowledge with hearty thanks the courtesy and assistance of Dr. A. Silkman.

*CLINICAL SYMPTOMS AND PATHOLOGIC ANATOMY OF GLANDERS.

By W. Reid Blair,

New York City, New York.

Since others on the program will deal with the different phases of glanders, I shall endeavor to confine my remarks to the clinical symptoms and the pathologic anatomy of glanders in the horse.

The term "nasal glanders" is generally applied to that form of the disease in which the lesions are situated in the nose, the nasal sinuses, and the submaxillary lymphatic glands. When the principal lesions are situated in the lungs and lymph glands of the chest, the designation "pulmonary glanders" is applied. When the skin and subcutaneous lymphatics are most prominently affected, the disease is spoken of as "farcy or cutaneous glanders." Glanders appears in two primary forms: acute and chronic.

Acute glanders may be the primary form or it may develop from chronic glanders which has become generalized. It usually assumes the form of a very rapid septic, infective disease. Some of the earliest symptoms are chill accompanied by a high fever, prostration, loss of appetite, lachrymal discharge, snuffling breathing and discharge from one or both nostrils. The nasal discharge is at first serous, soon becoming glutinous and tending to glue together the long hairs and the margins of the nostrils. The visible nasal membrane is swollen and congested, and is covered with tubercle like elevations of varying sizes, which soon undergo rapid degeneration, forming rounded ulcers with serrated edges. These ulcers may be isolated or they may become confluent, and a large section of the septum may show one continuous ulcer with excavations of various depths, and be covered with greenish or brownish diphtheritic crusts. At an early stage, the submaxillary lymphatic glands become swollen and hard, but without any excessive heat or tenderness. The glands may occasionally suppurate, but there is usually no great tendency to discharge by the formation of an abscess. On the side of the face there frequently ap-

* For discussion on Glanders see page 463.

pear firm, rounded cords formed by the swollen lymphatic. These cords stretch upward from the submaxillary glands and nostrils to the eye. Along the course of these superficial lymphatics there appear a number of rounded nodules about the size of hazel-nuts, which, unlike the submaxillary glands, tend to rapidly soften, burst and discharge a viscid, glairy liquid.

CUTANEOUS GLANDERS OR FARCY.

The early symptoms of cutaneous glanders or farcy are, fever, loss of appetite, and swelling of one or more of the limbs. The main symptoms may be the swelling of a joint, frequently the hock, with more or less engorgement of the limb from attendant lymphangitis, and accompanied with pain and lameness. At intervals along the line of the lymphatic cords appear nodular masses varying in size from a pea to a hen's egg, and which show a great disposition to soften and discharge a more or less bloody liquid, leaving a ragged-edged unhealthy looking sore. The inner sides of the fetlock and hock joints are favorite seats of these nodules, but they may form at any point. On the trunk also the corded lymphatics and nodules follow the lines of the veins, and here there may appear large inter-muscular abscesses often in connection with the groups of lymphatic glands. In some instances farcy is confined to the cervical lymphatics, and on examination of the neck, frequently along the course of the jugular vein, will be found the lymphatic duct swollen hard, and presenting irregular nodules along its course. These may not rupture externally, but other nodules soon appear in other parts of the body.

PULMONARY GLANDERS.

The early stages of chronic pulmonary glanders usually escapes notice, and the disease may run a course of several months before any suspicious symptoms are noted. Not infrequently a slight hemorrhage from one or both nostrils is the first symptom to attract the attention of the owner. Nodules and ulcers may appear on the nasal mucous membrane, associated with the enlargement of the submaxillary lymph glands. The swellings of these glands are usually adherent to the lower jaw. In exceptional cases an abscess, which is generally superficial, forms in these glands, opening through the skin and discharging a reddish-yellow sticky fluid which mats the hairs together.

The general condition becomes visibly impaired, especially if the animal is worked regularly. The animal loses weight and is easily fatigued under the usual labor, and perspiration is induced by slight exertion. The appetite is very capricious; and the coat becomes dry and rough. One or both of the hind legs may show more or less edema; edematous swellings may also appear on the lower portions of the abdomen, chest and scrotum. The nasal mucous membranes are paler than normal, and often of a dull grayish color. Occasionally there is a dull, soft cough which is noticed when the animal first comes out of the stable in the morning. Not infrequently the horse suffers from irregular or intermittent fever which often disappears entirely when the animal rests for a few days, but a few degrees of fever again appear as soon as the horse is returned to work.

The animal may remain in a very unsatisfactory condition without any apparent cause for weeks and months, and may die from marasmus and debility without any other symptom becoming apparent.

Symptoms of glanders or farcy may, however, appear any time and the animal develop acute glanders from which it dies in from two to five days. As a rule, chronic glanders ends fatally in consequence of its producing a generalized infection such as the septicemic form of glanders.

OCCULT GLANDERS.

Latent or occult glanders is practically always of the pulmonary type, and in many instances the disease is in such a mild form that the general health is scarcely affected, and special means of diagnosis are necessary for its detection. The various methods of detecting this form of glanders will be presented by others on the program.

Glanders causes, both in its acute and chronic form, purulent inflammatory changes, developing mainly in the skin and respiratory tract; pathologic changes also invariably occur in the lymph vessels and lymphatic glands, and in addition metastatic foci may follow in the liver, spleen and kidneys.

The anatomic changes occurring in glanders are specific inflammatory processes which are accompanied by suppuration, ulceration, granulation and cicatrization.

The microörganism of the disease, the Bacillus mallei is always

present in the tissues which are the seat of glanders changes and in the discharges of the subject mixed with glanders pus.

After the bacilli gain access to the invaded tissues, they produce, by the influence of their metabolic products, a progressive cellular necrosis, transforming the cells of the invaded tissues into finely granulated detritus. At the same time there occurs a continual emigration of the white blood cells or leucocytes, thus setting up a local inflammation, which in the chronic form of the disease, produces a wall of demarcation by fibroblasts. With the persistent and progressive multiplication of the bacilli in the inflamed tissue, this limiting new tissue is, however, continually broken down and the area of destruction is enlarged.

The metabolic products of the organisms, developing in the system, by their toxic influences, occasion fever and emaciation. The bacilli and their toxin are carried by currents of secretion and may lodge in a fresh position on the mucous membrane, here again giving rise to new colonies, and the production of characteristic lesions.

The visual pathologic changes, occurring in glanders vary considerably with the virulence of the infection and the tissues involved.

GLANDERS LESIONS.

The typical glanders lesions are in the form of nodules situated on the mucous membranes; in the parenchyma of organs; in the superficial lymphatics, and the skin. Of the internal organs, the lungs and their pleural coverings are most frequently the site of lesions. The liver, spleen and kidneys only rarely show glanders lesions. The superficial lesions are found most often on the skin, and on the schneiderian mucous membrane covering the septum nasi.

The lesions in the nostrils consist of nodules and ulcers. The nodules may be seen on the inferior part of the nasal septum or in the conchae. They consist of dense collections of leucocytes.

These nodules quickly change into superficial or deep seated ulcers, the loss of substance giving the mucous membrane an appearance of being eaten or gnawed. The ulcers are about one-third of an inch in diameter; their edges irregular and slightly raised. Large ulcerous patches of an inch or two in length may be formed by confluence of the smaller ulcers and these have thick wall-like, eroded margins. Associated with the nasal ulcers, the

submaxillary glands show nodular prominences which may break down in the form of superficial abscesses.

The lesions in the skin consist of nodules or boils which later break down into ulcers and are then spoken of as farcy-buds. There is no essential difference between the pathology of the farcy-bud and the glanders nodule. These boils may appear on any part of the body, but most frequently on the hind legs, shoulders, breast and belly, and are situated partly in the skin and subcutaneous connective tissue, varying in size from that of a marble to an egg. They are sometimes found in rows along the course of the lymphatics and form a chain of suppurating foci matting the hair with the discharges. They generally fluctuate and contain a thin, oily, yellowish-red pus.

Lung Lesions: In the lungs we see the typically characteristic glanders nodule. These appear throughout the lung structure as grayish-red prominences or deposits ranging in size from that of a small pea to a marble.

On examination of the lungs, the glanders nodules are readily felt by passing the hand with firm pressure over the surface of the lung, which, when badly affected, will feel like a bag full of shot. The distribution of the nodules is very irregular. There may be only two or three present in the entire lung, or there may be more than one hundred in one lobe.

A section of these nodules shows, in the center, a pale yellow point in consequence of caseation and disintegration of the innermost cells. The nodules will be found of different sizes, and of different ages. The appearance of the nodules vary somewhat with their age; the younger ones being in the form of grayish or yellowish specks, varying in size from that of a pin-head to that of a pea. These are invariably surrounded by a red or hemorrhagic area. The older nodules are larger and appear somewhat uniform in size and shape, like a hazel-nut. The periphery of the older nodules is made up of connective tissue and in these the tissue becomes quite fibrous while the central part is either purulent of caseous.

In many cases of pulmonary glanders, the lung tissue shows hepatized areas varying from two to eight inches in extent. These solidified areas are sometimes so extensive as to involve half of one lobe and resemble the stage of gray hepatization as seen in pneumonia. On section these areas appear reddish-yellow or grayish-yellow and cut with the consistency of bacon leaving on the

knife blade a turbid muco-purulent juice. Sometimes in such sections extensive purulent liquifaction and small cavity formations are seen, the cavities containing an oily pus. Again these infiltrated parts of the lungs are of a gelatinous consistency, and resemble on section a soft sarcoma. In this type of glanders the mediastinal glands are generally involved, and they appear as enlarged indurated masses which on section show many small foci of suppurative necrotic destruction throughout the gland.

In the lungs of the horse, and more particularly upon the pleura covering of the lungs, small irregular fibro-cellular or calcareous nodules, which are caused by a worm, are frequently found and these should not be mistaken for glander lesions. The calcareous nodules are rarely larger than a pea and microscopically are made up of the calcareous remains of the worm surrounded by leucocytes containing coarse granules, which stain with eosin. These nodules are never surrounded by a hemorrhagic zone which is such a marked feature of a glanders nodule.

The microscopic appearance of the typical glanders nodules is quite characteristic and constant.

The younger nodules begin as a collection of leucocytes; at a later stage large round and epithelioid cells are found outside the central part, and an occasional giant cell may sometimes be seen. The air cells surrounding the nodules contain a croupous exudate, made up of fibrin, leucocytes and red cells. During the development of the glanders nodule small interstitial and peripheral hemorrhages are not infrequent and an associated pneumonia is usually present. The pneumonic condition may be restricted to a small zone around the node or it may involve a large area of the pulmonary tissue, giving rise to alterations that closely resemble those of croupous pneumonia.

In the older nodules the center is necrotic, consisting of disintegrated cells surrounded by a large amount of new formed fibrous connective tissue. The walls of the small bronchial tubes, in the vicinity of the lesions, are in a state of chronic inflammation and the lumen frequently filled up with a dense fibrinous exudate.

*QUARANTINE AND DISINFECTION IN CONNECTION WITH OUTBREAKS OF GLANDERS.

By George W. Pope,

Washington, D. C.

The necessity for imposing a lengthy quarantine upon stables in which the infection of glanders has appeared has of late years been obviated as a result of modern methods for diagnosing the disease.

Some of the older members of our profession will remember when we were handicapped in this respect. For instance in the state of Illinois some twenty years ago the appearance of glanders in a stable resulted in the slaughter of animals exhibiting clinical evidences of the disease and the establishment of a ninety days' quarantine with frequent inspections of all horse stock in the stable during such period.

Such prolonged quarantine and repeated inspection was annoying to the owner and, while at that time the best known method of handling the disease, served but poorly for the eradication of same from an infected stable.

Later came the mallein test, not an infallible method of diagnosis, but one which enabled the practitioner to remove many affected animals which would not be discovered by physical examination.

Following was the application of the serum agglutination and precipitation reactions and still more recently we have been favored with the adaptation of the complement fixation test in the diagnosis of this disease, this probably being the best method for the determination of the presence of glanders which we have at our command at the present time.

Thus with our present methods of diagnosis a long and tiresome quarantine is not required.

However the establishment of a quarantine and the question of the same being close or modified will depend largely upon the authority vested in the sanitary officer by law.

In view of the ready means now at hand for determining the

*For discussion on Glanders see page 463.

presence of the disease it is doubtful if other than a provisional quarantine is necessary in these cases and while it is not possible to prescribe any hard and fast rule which will govern in all instances, much depending upon circumstances and extent of authority, the following is suggested as a method that can be very generally adopted and which, while imposing upon the owner the least possible inconvenience, should yield satisfactory results in the eradication of the disease.

Such method consists in the establishment of a provisional quarantine either prior or subsequent to the removal of all animals which upon physical examination have been condemned as affected with the disease.

The owner need not be prohibited from using the remaining animals provided they are entirely free from any evidences of the affection.

Certain restrictions, however, should be imposed including the closing of the stable water trough and the providing of a water bucket for each individual horse the same to be used both in the stable and on the road.

Brushes and curry combs should be immediately destroyed or thoroughly disinfected. The stalls vacated by condemned horses should be closed. Outside horse stock should not be permitted to enter the stable and the provisionally quarantined animals should likewise be prohibited from entering any stable other than their own, to feed at any public rack or drink from any watering trough whatsoever.

Having established such precautionary quarantine immediate measures should be taken to secure blood samples from all horses in the infected stable for the purpose of submitting the same to the complement fixation test.

The taking of blood and test of same will consume but a few days, this, however, depending somewhat upon distance from the laboratory to which the material is forwarded.

After removing and destroying all animals proven by such test to be affected the stable together with utensils, harness, etc., should be thoroughly disinfected.

Three weeks from the date of above test blood samples should be taken and a second test made in order to determine whether or not any of the remaining animals have developed the disease during the interval between tests, this being a possibility in certain cases as a result of previous heavy exposure.

Should there be no reactions to such test the quarantine may be raised. Likewise should one or more horses prove infected as a result of this record test it will probably be evident upon post-mortem inspection that the disease was of very recent origin and under such circumstances it will not be necessary to give the entire stable a second disinfection but that immediate portion of the building which has been occupied by the reacting horses should be thoroughly disinfected after which the stable may be given a clean bill of health.

DISINFECTION.

In connection with the work of disinfecting a contaminated stable there are three essentials:

First: A preparation of the building that will facilitate reaching the organisms of disease.

Second: A disinfectant which upon contact can be depended upon to destroy such organisms.

Third: A method of applying the disinfectant that will assure the most thorough contact with the bacteria.

Before beginning the use of a disinfectant it is essential that certain preliminary work be done in and about the stable that is to be treated. The various surfaces, such as ceiling, walls, partitions, floors, etc., should be swept until free from cobwebs and dust. Any accumulation of filth should be removed by scraping and scrubbing with hot water and washing soda. In some cases the woodwork may have become softened and so porous as to be a good medium for the absorption of disease germs. Such woodwork should be removed, burned, and replaced with new material.

All refuse, manure, etc., from stable and stable yard should be removed to a place inaccessible to live stock and, if possible, be burned or thoroughly mixed with a solution of chlorid of lime in the proportion of six ounces to one gallon of water. If the floor is of earth, it will doubtless have become stained with urine and contaminated to a depth of several inches. In such cases four inches or more of the surface soil should be removed and treated as above suggested for refuse and excreta. All earth removed should be replaced with soil from an uncontaminated source, or better, a new floor of concrete may be laid, this being the most durable and sanitary material for the purpose.

Having made ready the field of operation, the next consideration should be the selection and preparation of the disinfectant.

The fact must not be overlooked that many agents used for the destruction of bacteria are likewise poisonous to animals and man. In fact, some drugs, although powerful as germicides, are so poisonous as to preclude their general use in the work of disinfection. Among such is bichlorid of mercury, which possesses the power of destroying not only bacteria, but spores as well.

But while possessing great germicidal power in a solution of one to five hundred or one to one thousand and having the advantage of low cost and of leaving no odor in the stable bichlorid of mercury has the disadvantages of being a violent poison, of corroding metals and of uniting with albuminous substances, such as excreta, blood, etc., and thus forming inert compounds.

Thus care should be exercised in the selection of the disinfectant and an agent should be selected having a known germicidal strength, properties of solubility, and at the same time possessing a reasonable degree of safety to animals and man.

All things considered, it is probable that some of the coal tar products best fulfill these requirements. In this class is the compound solution of cresol, a preparation recognized by the United States Pharmacopeia and known as liquor cresolis compositus (U. S. P.). This preparation mixes readily with water and will prove a very efficient disinfectant. It should be used in the proportion of four or five ounces to each gallon of water.

Another favorable agent is cresol (commercially known as liquid carbolic acid). It is not as soluble as liquor cresolis compositus and should be thoroughly stirred during the process of mixing, which will be facilitated by using hot water. It is advisable to secure a grade of the drug with a guaranty of ninety-five per cent pure, and such should be used in the proportion of two or three ounces to a gallon of water.

As an accessory preparation and for use after the application of the disinfectant it may be advisable to make ready a lime wash to each gallon of which there has been added four ounces of chlorid of lime, or if it appears desirable to use the disinfectant and lime wash at one application, the following method may be followed in preparing five gallons:

Slake seven and one-half pounds of lime, using hot water if necessary to start action. Mix to a creamy consistency with water. Stir in fifteen fluid ounces of cresol (commercially known as liquid carbolic acid) at least ninety-five per cent pure, and make up to five gallons by adding water. In case compound solu-

tion of cresol (liquor cresolis compositus) is used, add thirty fluid ounces instead of fifteen as in the case of cresol (liquid carbolic acid). Stir thoroughly. If to be applied through a spray nozzle, strain through a wire sieve. Stir frequently when applying and keep covered when not in use.

The entire interior of the stable should be saturated with the disinfectant and special attention should be given to the feeding troughs and drains.

If a good spray pump is used and the operator uses care to cover the entire surface and drive the disinfectant into every crack and crevice he may be reasonably certain that he has destroyed any organisms of glanders which may have been present.

*PREVALENCE OF GLANDERS, COMMON MODES OF DISSEMINATION, CONTROL AND ERADICATION.

By J. G. Wills,

Albany, New York.

Glanders or farcy is one of the most important infectious diseases of horses with which live stock authorities have to contend at the present time. It has appeared in practically every portion of the civilized world inhabited by the equine race. The disease is widely distributed upon the American continent, and at the present time there is no considerable section of the country where horses are found entirely free from occasional cases. The possible transmission of the disease to man adds to its importance from the standpoint of human as well as veterinary medicine.

The spread of glanders has been aided by promiscuous traffic in horses and mules, by the assemblances of large numbers of these animals in the execution of public enterprises, such as canal and highway building, by the collection of cavalry horses at army maneuvers, and similar gatherings, and in fact by the intermingling in various ways of infected animals with others capable of acquiring the disease. We are told by writers upon this subject that glanders has been noticed to have increased in prevalence after the close of great wars, this being especially noted after our own Civil War, when it was carried to many districts previously free from it, by infected horses and mules from the armies of the north and south. Likewise the Mexican and Spanish American wars aided in introducing the disease into Mexico, Cuba and adjacent islands.

Glanders is said to be unknown in some of the isolated countries, especially where efforts have been made to prevent its entrance; among the most notable examples of which are the islands of Australia, Iceland and New Zealand, the disease having been kept from gaining admittance by rigid quarantine, and careful veterinary inspection of all imported solipeds. In western United States and Canada, the disease is more or less

*All discussion on Glanders follows this paper.

prevalent, but apparently not as much so as in the larger cities, and more thickly populated districts of the east, where conditions present more favorable opportunities for its spread.

The means by which glanders is distributed were until recent years little understood, and even at the present time there is a wide difference of opinion among scientific men in relation to many of these questions. It was formerly believed that the disease was disseminated directly from the infected to the healthy animal; later it was found that it followed contact of susceptible animals with contaminated objects occurring in stables in which glandered animals had been kept, and where disinfection had not been thorough. In this way the public watering trough, blacksmith shop, hitching stables and similar agencies have come to be considered as important communicating channels in localities where glanders is prevalent. Irresponsible horse dealers are also important mediums for the distribution of infected horses, and the wandering gypsy horse trader has always been credited, sometimes unjustly, with having carried the disease to localities where it was seldom, if ever known previous to his visit. Owing to the character of the malady, the most careful physical examination by a skilled veterinarian does not prove of any great value in protecting against purchasing infected animals.

Veterinarians are also in some parts of the country to be held responsible to some extent for the increase in prevalence of the disease. This may sometimes be due to ignorance, or a positive indifference as professional men, to the welfare of the public. The fear of financial loss because of decrease in patronage may cause the unscrupulous practitioner to conceal from his client the true nature of the ailment, and may lead to the suggestion that the owner dispose of the diseased horse, which results in the infection being scattered and perpetuated. Treatment is sometimes suggested by such men in order to obtain the fee, when a more careful consideration of the case would show that such a procedure was not only useless but dangerous. The concealment or disposal of known glandered animals by veterinarians and others, so that they may not come to the attention of proper health or sanitary officials, is a custom productive of many bad results, and cannot be too severely censured.

The theory formerly quite generally accepted, that only visibly glandered animals are dangerous is now doubted, although this is a much disputed question. It is possible, and indeed prob-

able, that cases of pulmonary glanders and other internal forms of the disease could exist in such a stage of development as to allow the infecting virus to escape from the body of the host, and yet the animal be apparently healthy as far as physical appearance would indicate.

The investigations that have so far been made tend to show that glanders is most often contracted by the entrance of the organism into the alimentary tract of the healthy animal. Infection through the broken skin, or respiratory mucous membrane is by no means unimportant, the latter being more common if there is exposure to particles upon which the germ might be carried. Inoculation through the skin or membranes other than those mentioned is comparatively uncommon, and therefore not as important.

Since the bacterium mallei is strictly a parasitic organism, having no known habitat except in the tissues of the infected host, it is evident that could the escape of the virus be prevented, the disease would disappear upon the death and proper disposal of the individuals now infected. While this is an attainment to be sought, its accomplishment presents almost insurmountable difficulties in glanders as in many other diseases. We are, therefore, confronted with the problem of determining when the virus escapes from an infected animal, and the means by which it reaches the tissues of the succeeding host. While there are many obscure carriers of the germ, it is quite obvious that the danger of infection is in quite direct proportion to the proximity of the susceptible animal to the spreader, whether it be by direct contact, or through inanimate objects, such as water, food, utensils or surfaces where the virus has been recently deposited. One of our greatest difficulties, therefore, is to determine when glandered animals become capable of distributing the infection, and how to detect the approach of that stage of disease. Although there are at the present time several specific procedures for the detection of glanders there seems to be none that can be entirely relied upon, or that is accepted as meeting all requirements. Of the common methods, mallein, the agglutination and complement fixation tests seem to be the most satisfactory, although each has its advantages and limitations. No test seems to have yet been devised indicating in any positive way the extent of development of the disease in the living animal.

The control of glanders presents one of the most complicated

problems with which the veterinarian has to deal. The greater prevalence of the disease in the city brings into consideration difficulties not encountered in the country. Among these may be mentioned closer contact on the streets, more crowded stables, undesirable sanitary conditions, animals handled by unskilled persons, having no pecuniary interest in the animal, and many other conditions. On the other hand, more satisfactory methods of inspection and supervision can be put into effect in districts where horses are stabled in large numbers than where they are running at large upon the range, or kept upon widely separated farms where it is not possible or practical to make as frequent examinations, and where veterinary assistance is not always easily available. Eradication of this disease where a large number of animals have been exposed, or may be infected, becomes from an economic point of view, a matter of great difficulty, and the attitude of the owner of the animals must be considered when devising any method of control. In many instances, more satisfactory arrangements for supervision or control can be made with those who own large numbers of animals than is the case with the person who has only a small financial interest in live stock, and is disposed to resist interference.

In the control of glanders, one of the most perplexing questions is in reference to disposition of occult cases,—those animals in which diagnostic agents have indicated glanders. The fact that we are unable to determine how soon such animals become "spreaders," or what percentage of such cases will recover, leaves a most important problem unsolved. The large number of reacting, but apparently sound equines which would be found if all horses in certain districts were tested, makes it impracticable to destroy all such animals, as appropriations for the payment of indemnities to owners cannot in most states be obtained, and the confiscation and destruction of live stock without payment of some compensation while it may be theoretically proper, in practice only results in dissatisfaction and opposition. Where but a small percentage of animals are found glandered, a radical method is to be advised, but the depletion of the equine population would be so great if such a plan were put in effect in our large cities, that it is very doubtful if public sentiment would allow such a method to be carried to a successful conclusion, even if sufficient funds for so doing could be obtained. The reports of certain veterinary practitioners indi-

cating that only a small percentage of occult glandered animals develop into clinical cases of the disease, would, if correct, tend to show that proper supervision of such cases would be sufficient, and that slaughter would not be necessary, except in such as develop physical evidence of the disease.

Prognosis in reference to animals suffering from occult glanders is dependent upon so many influences both internal and external, that accurate prediction as to the outcome in individual cases is impossible.

In some of our larger stables, careful attention by a competent veterinarian, with the immediate destruction of all clinical cases of the disease, has apparently controlled the outbreak. It is probable, however, that by this method infected animals are still left in the stable and some of such arrested cases, if subjected to unfavorable conditions might again develop active glanders, and become sources of danger.

The possibility of successfully treating glanders has been widely discussed. There is no doubt that many horses become infected, but never develop external evidence of the disease, or become dangerous to others. Some such cases apparently remain in the quiescent stage for years, but the lesions may become active should the vitality of the animal be lowered by other diseases, over-exertion, unsanitary surroundings, or any other debilitating influence. In other animals, because of the resistent forces in the body of the host, or because of the virus being attenuated, the disease is confined to a small area and becomes sufficiently incapsulated to effectually prevent further increase of glanderous tissue, unless affected anew.

Our lack of experiment data as to what proportion of infected animals recover or progress to advanced glanders, makes it impossible at the present time to suggest any definite method in relation to the control of the disease. While we all have certain theories and opinions in relation to these points, yet when we attempt to prove our contention, we find that there is practically no authoritative data upon which to base our conclusions.

The tendency to consider animals as cured or healed when the disease is only arrested has resulted in much discussion and dissension among veterinarians and others who have studied this disease. It is very doubtful if an animal which has well developed glanderous lesions in its body can ever be considered permanently cured, in the strict sense of the term. If clinical evidence

of the disease is ever shown, we believe that such animals should thereafter be considered as a menace to all susceptible species, and absolutely segregated or destroyed.

Glanders vaccine as a prophylactic and curative measure has been quite widely advocated. The results obtained have been, as far as we are able to learn, indefinite. The use of vaccine has contributed to the existing confusion in relation to glanders and because of its indiscriminate use often by incompetent men, and under unfavorable conditions, has been productive of more harm than good. The use of such products before their value has been determined by proper scientific experiments only tends to complicate the situation. Since the administration of glanders vaccine interferes more or less with the various tests for glanders, its use should be prohibited, except under proper supervision, until such time as its value can be with certainty determined. It is desirable that we minimize as far as possible the opportunities for complications, and mistakes by preventing the use of biologic products by the unskilled men. The development of modern methods of diagnosing glanders has placed in the hands of unscrupulous persons a means of detecting many occult cases of this disease, enabling such persons to arrange for disposition of suspicious animals, if they are so inclined.

All animals showing suspicious evidence of glanders should be brought to the attention of the proper health and sanitary officials, so that they may be kept under proper observation. The disposal of suspicious animals should be prohibited, and a heavy penalty inflicted upon violators of such orders. The inspection of all equines passing from one state or province to another will evidently have to be required, and the movement of such animals, except when accompanied by certificate of health, prohibited. Through disinfection of premises where known glandered animals have been kept or harbored is essential, and neglect of this precaution has been a prolific means of infection in the past.

Our lack of scientific knowledge in relation to many of the points which have been touched upon here would seem to necessitate further investigation before we can determine upon a method of control of this disease that will be effective. Furthermore, it is very evident that a uniform scheme applicable to all conditions and to all sections of the country can hardly be possible, owing to the varying circumstances under which

animals are stabled or harbored. The difference in climatic conditions and many other influences beyond the control of man.

There are in our opinion four important questions to be considered and at least partially solved before we can expect to make any great advances in the control or eradication of glanders:—

First. The development of an accurate method of diagnosis adapted to general use.

Second. Some positive knowledge as to the relative danger from occult, but known glandered animals, as compared with those showing physical evidences of the disease.

Third. More definite information as to the efficiency of glanders vaccine, which is credited by some with having certain immunizing or curative properties.

Fourth. More conscientious and better trained veterinarians, who will more carefully consider the interests of their clients, and by so doing assist in protecting against losses from infectious diseases.

In the foregoing paper we have endeavored to point out some of the difficulties which have seemed most important, and have refrained from attempting to suggest definite methods of control. By referring to a few phases of the subject, we hope to have prepared the way for a further consideration of the disease by the experts here assembled, believing that more knowledge will be gained in discussing the situation than is possible by placing before you the opinions and views of one observer.

DISCUSSION.

Dr. Reynolds: The line of thought that has occurred to me is perhaps not quite what was assigned to me by Dr. Gill. The features that appeal most to me in this discussion are questions that deal with measures of state control.

It is a great comfort in our line of work to know that certain things are well demonstrated, that we may accept this thing or that as sound. I think we are far enough along in glanders work in this country now to say that certain general procedures in the control of glanders may be accepted as sound. I am going to mention those things that appear to me to be settled and sound. We have adopted these in our Minnesota work.

I have here a small chart which I submit in evidence of the soundness of these propositions. Those of you who are familiar with state control work, and especially with glanders, understand very well that the difficult problems are located—at least it is so in our state—in large cities—

in our large lumber camps, and in similar places. This chart presents the results of work in our state along certain lines during the term of years indicated. It shows the results of our state work at Saint Paul and Minneapolis during the term of years indicated. The search is more close and more severe every year.

CONTROL OF GLANDERS IN MINNESOTA.

Year.	No. Inspected.	No. Killed.	No. Quarantined.
1903-1904	3,408	554	170
1904-1905	1,722	480	144
1905-1906	1,812	606	246
1906-1907	2,784	516	240
1907-1908	2,486	513	211
1908-1909	5,761	353	116
1909-1910	5,029	213	82
1910-1911	6,012	141	56

DECREASE OF GLANDERS
in

Year.	Saint Paul. KILLED.	Minneapolis. KILLED.
1904	59	117
1905	51	110
1906	71	117
1907	34	48
1908	15	13
1909	4	5
1910	8	9
1911	0	7

You will notice a sudden drop* at about the point (1907). That was about the time we closed the public water fountains.

This chart shows similar results for work in the entire state. In 1904 there were killed in the City of Minneapolis one hundred and seventeen, in Saint Paul fifty-nine, and there is a decrease on down the column until we come to 1911, and we find none in Saint Paul and seven in Minneapolis. For the entire state the results are similar. In 1903-1904 we killed in the entire state five hundred and fifty-four horses, and in the year 1910-1911 we killed one hundred and forty-one, with approximately twice as many horses inspected. That is a ratio of about one to eight for 1911 as compared with 1903.

The procedures, which I think may be accepted as sound, are:

First, testing with mallein all exposed horses.

Second, killing all reactors as soon as practicable.

Third, all lumber camps, railroad construction camps, and similar places to be tested out as soon as possible after the gathering. In the northern

*Refers to chart.

part of Minnesota horses come in from this and surrounding states and gather in great lumber camps at a certain season. Dr. Ward representing our Board has followed the policy of sending a man to these camps as early as possible and testing every horse in camp. This has been a great saving to the state.

Fourth, protect against importation.

Fifth, a policy of reimbursement.

Sixth, that field work should be done by veterinarians on full time in state employ rather than by private practitioners, as deputies or assistants.

Seventh, when non-clinical reactors are properly segregated, they may be used under restrictions for working purposes on the farm. This last is not a desirable procedure but may be advisable at times.

Dr. R. W. Ellis: Mr. President, I listened very carefully to the paper by Dr. Pope, but failed to hear much, if anything, regarding what I consider one of the most potent factors in the eradication of glanders, that is: the ventilation or proper amount of fresh air in the stable. Of course we are dealing here with prevention; but we not only want to quarantine against an invasion of glanders, but should make conditions such that an invasion would not be as easy as in a stable not kept in a proper manner. Dr. Pope, no doubt, was dealing with a stable with proper ventilation, but in stables in large cities we all know that is one of the things we do not have. In the city of New York where glanders, like the poor, is always with us, and probably always will be, two or three reasons account for its existence. One is that our stables are not often properly ventilated and, again, the horses are in a condition especially receptive to the germs of glanders, through being very much run down even though they may look to be all right. Certainly one of the first essentials as a preventive against glanders is the admission into the stable of plenty of fresh air to thus drive out and replace the vitiated atmosphere which is carrying germs of glanders or other diseases that may have a debilitating effect upon the physical condition of the animals.

As fresh air and sunlight are considered disinfectants—which they are in a measure—we should give heed to them, because they not only tend to discourage disease but aid in eradication of those germs floating in a stable poorly equipped with these agents. Heat in its various forms, either dry heat or hot water, preferably the ideal dry disinfectant or live steam where it is possible to have it. I have in mind a stable, about a fifty by one hundred foot structure, that accommodates a little less than seventy-five horses, that is connected with an establishment having two boilers; here it is a very easy matter to use live steam. In this stable the hose is used to force the steam into every crack and crevice, thus serving the dual purpose of a disinfectant and cleansing agent. Gaseous disinfectants, no doubt, are very practicable where it is possible to seal up the stable; otherwise they are of very little value.

Referring now to glanders vaccine, I regret very much that I am not able to confirm in every detail the very hopeful outlook for it that Dr. MacKellar presented. If findings similar to his were the same with all of us we certainly would have some solution of the problem that confronts those of us engaged in the big city practice. Unfortunately, how-

ever, my findings have not been so uniformly favorable and though at one time I certainly thought we had something that was going to help us stamp out glanders, after a while I found that, in stables where the very best of care had been taken, where all physical cases had been promptly destroyed, where reactors showing the least physical symptoms were destroyed, there the trouble came. Prompted by the seeming possibilities of this vaccine, we tried to save cases that manifested but slight physical disturbance. For a while it seemed as though the vaccine had saved them; but now, after resorting to vaccination every six months for a period of two years in one stable and four years in another, glanders is present in both. One horse that I recall more especially was vaccinated four times in two years at six months' intervals. This stable was under the strict supervision of the department of health, where every opportunity was afforded the vaccination test, using the same vaccine and same method Dr. MacKellar has told about; yet during all that two years' period every little while a horse would show symptoms that we could not overlook and the animal had to be destroyed.

All cases that did not at first show positive physical signs went to the dock and were posted by the department of agriculture and were reported back as positive cases. Only lately a case, vaccinated four times in two years and showing no evidences of glanders to the veterinarian of the department of agriculture, was destroyed and posted, and found very badly infected in the bronchial glands.

Two or three years ago in Chicago Dr. Rutherford advised destroying these reactors promptly. It simply seemed out of the question in the big cities, and our clients would not listen to it, but as a result of not following out that plan the stable I have been speaking of has continued to lose their horses by degrees and in the meantime exposing new ones, so that eventually the disease will take not only all they had then but perhaps more.

Segregation as suggested by Dr. Reynolds, of course, is not practicable in city stables; if it were we might not take a man's stock all away but put it in some place where he could use it. As it is, we have to face the conditions and let the owner take the consequences, for he will have to take them eventually.

Dr. Burnett: A knowledge of the pathologic anatomy of glanders, it seems to me, is one of the essential things to every veterinarian who has anything whatever to do with the disease. In state work, especially, (by post-mortem examinations), the diagnosis of glanders must be confirmed so that a knowledge of the lesions of glanders is essential. I do not intend to discuss the whole of this subject, but one particular point impresses me as being worth emphasizing in this connection; it was brought out by Dr. Blair. Among the lesions in glanders certainly those in the lungs are very important, if not the most important. I believe it was McFadyean said that lesions in the lungs were found in every careful post-mortem examination of cases of glanders. One form discovered in this region being that of the glanders nodules. Nodules, they may be few or many, are found scattered over the lungs or sub-pleura, hardened, often calcified in the center, and surrounded by a fibrous capsule; they

are sharply circumscribed and are not surrounded by hemorrhagic zones. These are worm nodules and it is very important that they be not mistaken for or diagnosed as glanders. I think Dr. Blair brought out the fact that in glanders the nodules are of various sizes and different ages in different cases of the disease. When one finds in a post-mortem examination of glanders that the lung is studded with a few—or it may be many—nodules about the same size and they are all calcified, they are worm nodules. They are whitish or whitish gray and stand out in marked contrast to the reddish brown nodules of glanders. I think Schütz was the first to describe the worm nodules and call attention the necessity of differentiating them from glanders. Two years ago I believe they were described by Olt.

Dr. Kinsley: As was stated in the paper by Dr. Blair, we find two general types of lesions in glanders, the circumscribed and the diffused lesions. The different types apparently result from the virulency of the infecting agent and the resistance of the animal. When the virulency is high and the resistance low we usually find the diffused lesion. When the virulence is low and the resistance high we usually find the circumscribed lesion, and usually in such cases the chronic form of glanders.

In relation to the lung lesions I have had opportunity to make some autopsies, and in Kansas City have found evidence in quite a large percentage of horses autopsied of what I suspected was glanders. I will leave it to you to decide. In a series of autopsies as much as twenty-five per cent of horses have been discovered affected and I do not believe the lesions found were due to parasitic invasion. Many of these lesions were small, about the size of a millet seed and calcified. I remember one case where the lesions were scattered throughout the entire lung, miliary in form. I am not certain in my own mind whether these lesions were parasitic. They were a dirty brown, not the pearly white, and did not shell out as does the parasitic lesion, which, as a rule, when incised, can be easily enucleated. In these lesions the fibrous tissues seem to spread or diffuse out into the lung tissue, and we rarely find the hyperemic zone because the bacterium mallei are probably dead and inactive. I would like some one to answer whether or not these are parasitic lesions. In the cases referred to the bronchial and mediastinal lymph nodes are invariably affected, as in cases of pulmonary glanders.

Dr. Ackerman: According to the program I am down to discuss the question of glanders vaccine. Vaccine as we ordinarily understand the term is an attenuation of a living bacteria, while this glanders vaccine as used by Dr. MacKellar and which is described by our New York City, Department of Health, the makers of it, is known as a dead culture vaccine. I am among the practitioners who have used this vaccine quite extensively during the last two or three years and the results have been uniformly good. Dr. Ellis has expressed some of the findings I have recently been running across. Until a few months ago I thought we had really discovered an agent that was absolutely protective, but now, from time to time, I find an occasional case among horses that have been vaccinated. If a horse has latent glanders, by the administration of this vaccine the case is hurried. The administrative dose is regulated

according to the case. If an animal is a suspect and expected to break out any day instead of starting with the minimum dose, the maximum is given at once when usually in a day or two a well defined case is developed. The results of the administration of vaccine does materially improve the condition of the horses; they pick up in flesh, their coats look better and in many instances horses vaccinated during a fever, show improved temperature, sometimes permanently, while at other times for a long period.

The problem of the eradication of glanders is an interesting one. I have come to the conclusion that we must do one of two things; either kill all reacting animals or have them so tagged, identified or marked that their identity cannot be lost. In speaking of the source of the spread of glanders various things are mentioned. I think the most prolific cause is the sale and disbursement of reacting animals. Either reactors must be immediately slaughtered or identified so that they cannot be sold promiscuously and thus taken to other stables to start new centers of infection.

In 1898 the mortality was reduced to almost nothing. After the Spanish-American war horses came back from the army or from Cuba with the disease. Many horses belonging to officers and men were brought to New York or Brooklyn so that in 1899 we began to feel the effect of it. From that time on glanders has grown rapidly.

Vice-President Moore: Unless there is objection the suggestion made by Dr. Meyer, in regard to a committee, will be referred to the Executive Committee direct.

Dr. Higgins: Unfortunately I was out when Dr. Meyer's paper was read. I do not know that I have much to offer on the agglutination or complement fixation methods of diagnosis, having had but a little experience and prefer to wait and see what results others will get. With complement fixation extreme care must be exercised as there are many factors entering into the question. While there are some diseases in connection with which we have at present no other means of diagnosing, it may be justifiable to go on and base judgment on this method. At the present time I do not care to make any statement with regard to the complement fixation test or its reliability.

Dr. Goss: While at the Alfort Veterinary College I met Dr. Angel M. Oyuela, who said that in his work on different methods for diagnosing glanders, he had concluded that they might be placed in the following order as to reliability: mallein, agglutination, precipitation, complement fixation.

Dr. W. J. Taylor: A few statements have been made in some of the papers relative to the agglutination test that I wish to discuss briefly. In the first place, I wish to remind you that in 1906, when in conjunction with Dr. Moore and Dr. Giltner I presented a paper at New Haven, the idea of agglutination test or any other test for glanders was comparatively new. I remember the statement being made after our paper was presented that, everything considered, we would have to fall back upon the mallein test for a positive diagnosis.

At the New Haven meeting also you will remember that Dr. Rutherford pointed out that after a long series of experiments with horses that had been subjected to repeated injections of mallein he was led to believe such animals became centers of infection through becoming non-reactors. That stimulated us to further investigation in regard to the agglutination test, and I spent the next year following out some lines in regard to this test that had not been previously worked out. The paper was presented in 1907, at Kansas City.

The first point I wish to bring up refers to the statement by Dr. Meyer that mallein should not be used during the time agglutination tests were being carried out. Again, recalling my paper of 1907 you will note I said at the time that agglutination test not only embraced agglutination, but it also was necessary for precipitation to take place in order to make a positive diagnosis. In a large stable under quarantine in New York mallein was constantly used, together with the agglutination test from blood drawn by myself. It did not have any effect upon agglutination as far as diagnosis was concerned, and when we applied mallein combined with agglutination there was no mistake.

The agglutination test as first worked out by Schütz and Meissner in 1905 was far less complicated than the test we now know as the complement fixation. Although more complicated than the mallein test, it does not exclude the man who has carefully prepared himself in the technique from carrying it out in private practice. I doubt whether there are many practitioners capable of applying the complement fixation test, but believe many could successfully apply the agglutination test.

In conclusion I want to say that I think Dr. Marshall touched the keynote of the whole situation in any of the four tests mentioned this morning, when he said glanders can be diagnosed if known diagnostic agents are carefully and intelligently used.

Dr. Rutherford: I listened to the remarks of the various speakers and I was glad to see that throughout them all there appeared to be a sort of general undercurrent of belief that the best fate for the reactor was sudden death. I think there can be no question about that, and we have demonstrated it in Canada fairly well. We have had difficulties and troubles, but have succeeded to a remarkable degree in eradicating glanders in most parts of the Dominion.

Although not brought out clearly by our own official figures because for the first six months after we began to slaughter in 1904, we paid no compensation for clinical cases, nor did we operate in the province of Manitoba where the provincial authorities were then in charge, the amount actually expended in compensation during the first twelve months during which our present policy was in full operation reached a total of $208,000.00.

It came down very rapidly, however, and at the present time our compensation throughout the whole of Canada is in the neighborhood of $50,000 a year; the great bulk of that is in the province of Saskatchewan. In regard to Saskatchewan two facts stand out relative to this state of affairs: One is that in this province glanders prevailed to far the largest extent in the period between 1902 and 1904, during which time we were

following the policy of testing, retesting and discharging the ceased reactors; in other words, before we commenced to recognize that the most dangerous brute in the whole lot was the ceased reactor. The other factor is the constant introduction of infection from the United States by horses taken there by immigrants. This is well worthy of attention, in view of some of the things said since I have come into the room. These immigrants very often buy their horses in the public markets and stock yards in Chicago, Kansas City, East Saint Louis, Omaha, and other places of that kind. Horses that are very often the rejects, the culls from large studs that have been subjected to a private mallein test, and placed on the market to be sold at a slightly reduced rate in order to get rid of them. Having been subjected to the mallein test several times they do not react very readily, and very often the United States veterinarian who tests them acts in perfectly good faith and does not recognize that he is dealing with dangerous animals. If they are tested by our own people at the boundary the same thing occurs, they are ceased reactors. It is true we have a clause in our regulations under which the settlers' effects enter duty free, and it is necessary to take an affidavit that a man has owned his stock for six months prior to presenting them for entry; but there seems to be a general elasticity of conscience in regard to this matter, because our secret agents have repeatedly traced cases where the horses had only been owned by the settler ten days.

As already intimated we have reduced the expenditure in the Dominion from over $200,000 to approximately $50,000 a year, and I have not the slightest doubt, with the policy now being pursued in Saskatchewan, together with the efforts which my eminent and capable successor will put forth that that province will soon be altogether free from the disease. In the other provinces glanders has become a negligible factor. The lesson to be learned from our experience is that while the first cost of destroying all reactors may be somewhat alarming, it is as a matter of fact the most economical policy that can be pursued as regard glanders. We do not claim to be perfect, mistakes are made now and then; moreover, it is absolutely essential that the tests should be used with care and judgment. We may have an inspector on the staff who has not had quite as much experience as he ought to have had and he may make a mistake, but as a rule the mistakes are few in number. I want to repeat once more that even if an occasional mistake does take place it is better that fifty sound horses should be destroyed rather than that one glandered horse should be allowed to live, and I think that is sound doctrine.

We are now in this position in Canada: Before relinquishing office in Ottawa I was able to recommend to the minister of agriculture that there should be a large increase in the amount of indemnity paid for horses destroyed on account of glanders. The amount we are called upon to disburse for that purpose has decreased so much and the prospects of the entire eradication of glanders are so good that I felt called upon to advise an increase in the amount of compensation paid to the owners of animals destroyed.

It is very gratifying to me to see so many members of the Association,

so many of those who are responsible for the control of this disease, coming around to the view which you will all remember when I first enunciated it before you, made you rather inclined to think that on this particular subject I was, even more than in regard to others, what I have often been called anyway, a crank. I thank you very much for giving me this opportunity to speak to you, and although I am not at present associated with professional work I trust I may long be able to retain my membership in the American Veterinary Medical Association.

Dr. DeVine: This discussion has so taken up the various phases of the question that there is little left for me to say. I will, however, emphasize some statements that have been made by the other speakers. Dr. Marshall brought out some very important things for men who are engaged in practice and are perhaps not engaged in laboratory work. Unfortunately I see very few of that kind of men here. It pleased me to hear Dr. Marshall say that, all things considered, mallein is as good a test as we have. I think so too. It is true that other tests are oftentimes of great value when used either in conjunction with or independent of mallein and may replace it in time, but I hardly think they have yet. He spoke of taking blood samples to have examined and confirm or deny the mallein test. Suggesting that we ought to take blood samples before injecting mallein, this is an important practical point that does not seem to be generally known; also he points out the necessity of doing our work carefully, adding that where no clinical symptoms are present in horses it is at times difficult to make an owner believe the horse is diseased. This is a very important warning particularly to young men because if we have in any way been careless in our work the owner has the loophole of objecting to our decision and of consulting other people to find out whether or not our test has been accurate. This as practical men know is very unfortunate because an indefinite mallein test is never satisfactory and it is frequently impossible to immediately have it followed with a reliable test more especially because after the mallein has once been introduced into the system it is liable to interfere with blood tests. There is also the danger of the tissues acquiring a tolerance against subsequent inoculations which not only cause an endless confusion but an unnecessary and unwarranted condemnation of the reliability of our diagnostic agents.

Dr. Wills brought out some important points in his paper. He referred to the fact that animals which react to any of the recognized tests but which have no characteristic clinical lesions are the ones that give us the most concern. Those animals in which glanders can be clearly diagnosed by clinical symptoms cause the least trouble. The layman or owner is usually willing to accept a diagnosis in such cases and anxious to have the animal destroyed without controversy, but the reacting animals that to all appearances are in perfect health are the ones that continue to cause controversy, spreading the virus and will continue to do so until our bacteriologists or pathologists can give us a method of telling with some certainty when an animal is distributing virus and when not; or possibly until a policy is adopted to either destroy every animal in which glanders is diagnosed by any reasonably certain test or

hold in strict quarantine for a sufficient period every animal that is considered suspicious. Dr. Rutherford has told us, that an animal that once reacts is a dangerous brute forever, and I am quite inclined to agree with him that the destruction of all diseased animals to thus guard against renewed infection is no doubt the proper way to deal with the problem. Were this method adopted in our larger cities, particularly New York—all of you turn out, it will need all of you, examine, test, disinfect and clean up—and every reacting animal destroyed there would not be enough horses left in that city to require a corporals guard of veterinarians to look after their ills.

That is the condition that confronts us in cities like New York and what are we going to do? We have talked and talked for ten years and have come to no conclusion. Are we going to kill all infected horses or just kill clinical cases and let the animal race kill itself in time? I leave that question with you.

Dr. Rutherford: It seems to me that while we respect very much the heroes of Waterloo, for instance, as men who laid down their lives in behalf of their country, and likewise respect in the same way those who died at Gettysburg, that when we come to consider the case carefully we realize that those chaps would all be dead by this time anyway. Those horses our friend speaks of will all die some time, and I think they may as well die now as at any other time. It seems to me it is only a matter—if New York City is so terribly bad off—of taking hold of the thing in a broad, comprehensive spirit, getting the municipal or state authorities to put the figure of compensation up to such a height as to render the loss to the individual owner as low as possible, get rid of those brutes and put others in their places, and the problem will be solved.

Dr. W. H. Hoskins: As I look back over a period of more than thirty years as a routine practitioner I recall a great many experiences in the second largest city of our country, the city of Philadelphia, and am going to take issue with some of the deductions made by some of those who have been dealing with the disease, especially from the laboratory point of view. During the period referred to there have been five or six occasions in the city of Philadelphia when glanders prevailed to a greater or less extent in an epizootic form. For more than twenty years of that period there were no methods for its eradication or destruction save the clinical knowledge of the veterinarian employed to deal with the outbreak. On at least four occasions during that first twenty years of my experience in Philadelphia, I had considerable experience in dealing with the disease and we were fortunate enough even in those days to effectually eradicate glanders under the plan of destroying those that presented actual clinical symptoms or animals that we felt were at least suspicious.

I recall an experience some fifteen years ago in one large stable, containing more than one hundred horses, where the disease had prevailed for two or three years. I went in there and destroyed all animals that presented actual clinical symptoms and those that were suspicious on account of their general run-down condition; thoroughly disinfected the stable with the flame and with disinfectants, and for a period of eight or nine years subsequent thereto we had not a known case in that stable.

I think it is very unfair at this time, or rather dangerous, to conclude because you destroy all animals reacting to the mallein test that you have accomplished the eradication of the disease, for it has returned periodically to our large cities every five or ten years for fifty years, not to my personal knowledge, but I gain this from the records of older veterinarians in large cities. It has invariably followed, and has continued through a longer period, when it was spread through the horses that were gathered in the armies during troubles within or without our borders. That was because we did not have a veterinary corps in the army to watch over them and attend to their final distribution.

If we would destroy every horse reacting to the mallein test in Pennsylvania we would destroy such an amount of property our state would be in danger—although it has not a dollar of state debt—of being placed in bankruptcy. I am not ready after almost five years of experience with the mallein test, to say it is a thoroughly reliable and accurate test, but believe it to be a great deal more reliable than one's judgment from physical symptoms. I recall one stable of more than one hundred horses where more than forty continued to react for three successive periods. That stable has continued under observation and three long years have passed by without a case. These reactors were not destroyed because not one of them presented any clinical evidence, nor has there been any single known case in that stable in the three years since I ceased to examine it under instruction of the state live stock sanitary board. I have kept in touch with the attending veterinary surgeons there and believe with two exceptions all the animals that died in that stable from other causes were autopsied and no lesions of glanders were found in any of them.

I am not ready to agree with Dr. Rutherford in all his statements. I will show him six periods in my lifetime when Pennsylvania almost escaped paying for any glandered horses for periods of four and five years at a time, covering a total period of thirty years. I believe all those animals ought to be kept under observation a long period of time, and one of the best things to do is to prevent new horses coming in contact with these horses or entering stables where the disease has prevailed for a long period.

The disease has invariably come back into the large cities from the western sales centers. More than twenty years ago Dr. W. L. Williams, when located at Bozeman, Montana, in a paper presented to this Association spoke of the disease existing on the ranges of Montana in a very mild form. He said that a very large percentage of the horses on the ranges were afflicted with glanders in a very light form, contracted from mares purchased in the large cities and taken there for breeding purposes. We can trace some of the outbreaks of the disease in Philadelphia to the bringing in of horses from those ranges. The disease has always started down among the poorer stables of the city where the sanitary conditions were not good. I think we want to have ten years of that extermination plan of Dr. Rutherford before we can accept the deductions he has made.

Dr. Reynolds: In places where the policy that Dr. Rutherford and I have advocated here, and elsewhere for many years, has been followed

good and permanent results have been secured. In states and municipalities where this general policy has not been followed, results have apparently been bad. The gentleman from Pennsylvania has just told us that if this policy were followed in his state, Pennsylvania would have to go out of business on account of lack of horses. His statement, if correct, suggests a rather bad situation existing now under a policy that has been in operation for many years.

VICE-PRESIDENT MOORE: I wish to call attention to one thing, and that is the difficulty that is before us in this sort of medley we have between laboratory methods and practical experience with the disease. It is somewhat discouraging to see how one method after another of diagnosing the disease is lauded to the skies and then dropped to the earth. It is exceedingly important that highly technical methods involving certain tissue reactions should not be put forth as practical methods of diagnosing glanders until their efficiency have been tested. It does seem that we must be careful about this.

I will not take time to discuss my views or facts I have in connection with these various methods; they all have their value and, in my opinion, all have their limitations. It is up to us as laboratory people and you as practitioners and executive officers to arrive at some methods that can be relied upon. We are coming into possession of a great fund of knowledge concerning tissue reaction we must take account of. I hope the committee Dr. Meyer has suggested will be appointed and more definite and positive knowledge will be brought forth at our next meeting.

DR. MACKELLAR: There is one point I wish to bring out. I do not know that Dr. Ellis is aware of the fact that the glanders vaccine in use for the last year and a half was only about one-quarter the strength it should have been. In fact it was simply the supernating fluid minus the dead organisms. This may account for some of the negative results Dr. Ellis has had.

DR. REICHEL: I have been in touch with the work on glanders vaccine of the New York board of health for several years. I did not know that the vaccine was tried on horses other than those of the department. To encourage its use is a serious matter in view of the fact that reacting horses subsequently treated with the vaccine may develop clinical glanders and the injections of vaccine into infected or noninfected horses destroys the value of all of the known tests for glanders at our command. It would be well for the committee on glanders to consider the dangers in the use of glanders vaccine.

DR. MARSHALL: I do not believe we have as much glanders in Pennsylvania as there is in New York City. Glanders is not especially prevalent in Pennsylvania. We could destroy all the horses in the state that are afflicted with glanders and it would not bankrupt one county or one township.

*HOG CHOLERA.

By C. D. McGilvray,

Winnipeg, Manitoba.

The occurrence of hog cholera in urban and suburban districts in certain sections of Canada, and the non-appearance of the disease in the rural districts, has shown a striking connection between such outbreaks and the feeding of swine upon uncooked kitchen refuse and garbage and points strongly to such material being a medium conveying infection and starting fresh outbreaks.

In the province of Manitoba, with the conditions of which I am familiar, hog cholera has only made its appearance on rare occasions. Dunbar reported an outbreak which occurred in the vicinity of Winnipeg during 1886 and Stevenson an outbreak near Carmen in 1899.

Since the latter time it did not make its appearance until August, 1911, when it was found to be in existence among pigs kept on premises in the district immediately surrounding the city of Winnipeg.

Almost simultaneously with the outbreak at Winnipeg, other outbreaks were reported in the vicinity of certain other urban centers in western Canada.

Efforts were immediately directed towards the control and eradication of the disease from these districts and to ascertain and determine the source of infection.

Searching inquiry failed to bring forth any evidence or information as to the infection having been introduced by fresh hogs brought into such districts and no possible history was obtainable of the infection having been thus introduced.

A rather curious and striking feature was that on all premises upon which the disease first manifested itself, the hogs thereon were being fed upon uncooked swill, kitchen refuse and garbage obtained from hotels and restaurants. On other premises, in the same districts, where the hogs were not being fed upon kitchen refuse and garbage, the hogs were found to be healthy,

* For discussion on hog cholera see page 527.

and remained so unless, and until, becoming infected by either direct or indirect contact, or intermediary means from premises where the disease had already manifested itself. In the latter cases information was obtainable that infection had been introduced by such means.

Dr. J. G. Rutherford, late veterinary director-general for Canada, in his report for the year 1910 refers to the possibility of outbreaks of hog cholera being started in suburban districts among swine being fed on uncooked garbage. Our experience and observations in connection with outbreaks of the disease dealt with in western Canada strongly indicates and supports the theory as to fresh outbreaks originating in many cases from such sources.

The outbreaks dealt with by us in the district surrounding the city of Winnipeg furnished strong circumstantial evidence in support of this theory, while other outbreaks subsequently dealt with at Kenora, Rainy River and Fort Frances in western Ontario, furnished even more striking illustration and convincing proof thereof.

In connection with the outbreak at Winnipeg which was of a serious nature and of large extent, we found the disease to be in existence on sixty-two premises. In order to eradicate the disease it was necessary to slaughter two thousand two hundred nineteen swine which were actually diseased or had been in close contact with diseased pigs, during a period extending from September to December inclusive.

During this time we also visited an additional two hundred twelve premises and inspected thereon two thousand one hundred ninety pigs, which were kept under close observation and inspected again at regular intervals covering a period of three months.

In the case of the outbreak at Kenora, it was reported to us, during October last, that some disease was causing serious losses among hogs on the premises of a Mr. H. Upon investigation it was found that the owner of these hogs conducted a hotel at Kenora and was feeding the swill and kitchen refuse from the hotel to hogs being kept on his farm premises some five miles distant.

The symptoms shown by these hogs, as well as post-mortem lesions, were characteristic of hog cholera. No fresh hogs had been introduced on the premises for over one year prior to the time of the outbreak and there was no apparent possibility

of them having come into contact with any other hogs for a like period.

Hogs were also found to be affected on three other premises which were separate from each other by several miles, and upon which the swine were being fed uncooked swill or kitchen refuse obtained from the hotels in Kenora.

The disease manifested itself on these premises almost simultaneously, without any possibility of infection having been introduced, either by direct or intermediary means, or any other source determinable.

On further examination of all premises upon which hogs were being kept in the vicinity of Kenora, which were kept under observation and inspected at regular intervals, covering a period of over three months, it was found that the disease only existed on premises upon which the hogs were being fed uncooked kitchen refuse or garbage, or on premises where garbage fed hogs had been introduced.

Of the outbreak at Kenora, on four premises one hundred forty-six garbage fed hogs were found to be affected. On two other premises, on which the disease was found to be in existence among seventeen hogs, the source of infection was traceable to the introduction onto the premises of hogs which had been obtained from one of the parties whose hogs were being fed on hotel kitchen refuse. The hogs which were thus obtained were the first to show evidence of the disease and the history obtained was that the other hogs on the premises had been entirely healthy until the introduction of the hogs referred to.

Hogs were also inspected at thirteen other premises in the district of Kenora, which had not been fed upon uncooked garbage and were kept under close observation for a period of three months, and again subsequently inspected after a further period of six months and remained entirely healthy.

Needless to state during this period, due precautions were exercised to prevent any possible infection being introduced from any infected premises.

Our experiences in dealing with the outbreak in districts surrounding the city of Winnipeg were similar to those at Kenora. The disease first manifested itself on premises on which the hogs were being fed uncooked kitchen refuse and garbage and then spread from such centers to other premises in the same

district. The history in all cases was so convincing as not to be lightly overlooked.

During the month of July of the present year, outbreaks of hog cholera were reported as occurring at urban points in the western portion of Ontario, at Fort Frances and Rainy River, and, upon investigation, some rather interesting features were observed.

A careful inspection was made of all premises in the districts upon which hogs were being kept. In all eighty-two premises were inspected with the following results:—

On fifty-nine premises, three hundred and forty-five hogs were inspected which were not being fed on uncooked swill or kitchen refuse. These were found to be healthy at time of examination and showed no evidence of disease.

On two premises, upon which the hogs were not being fed uncooked kitchen refuse, the disease was found to be in existence. In these two cases, however, history was obtainable of the infection having been introduced by animals obtained from other premises where hog cholera was detected.

On twenty-one premises we found that the hogs thereon were being fed uncooked swill and kitchen refuse obtained from hotels and restaurants. On ten of these premises we found the disease to be in existence, fifty-eight pigs were found to be affected, while sixty others had died a short time prior to inspection. On the remaining eleven premises, upon which were kept seventy-seven hogs, the disease was not in evidence at the time of inspection.

It will therefore be seen that out of twenty-one premises upon which hogs were being fed uncooked kitchen refuse and garbage, cholera was found to be in existence on ten of these, while on sixty-one premises, upon which hogs were not being fed such refuse and garbage, the disease was only found to be in existence upon two premises and, in each case, a history was obtainable of the infection having been introduced by hogs coming from premises upon which they were being fed garbage and the disease had manifested itself.

Close inquiry was made in connection with all of these outbreaks as to the possibility of the infection having been introduced by other hogs having been brought into the districts, but no information was available indicating such a source of infection.

The question might arise as to why the feeding of hogs upon uncooked kitchen refuse and garbage may give rise to the disease. In this connection it was invariably found by us that hotel refuse and kitchen garbage being fed to hogs contained quantities of pork products, especially pork cuttings and sausage.

In connection with our investigations as to the possible source of infection, we directed inquiry as to where many of the hotels and restaurants (from which was obtained the garbage being fed to hogs) had procured their supplies of pork products. As a result of our inquiries it was invariably found that these products were of a similar brand and origin, being obtained from the same firm which imports very large quantities of American pork products. It was also observed that coincident with the appearance of these outbreaks, large quantities of pork products were being imported by this firm. The distribution of these products to certain widely separated points was followed almost simultaneously, or in rapid succession thereafter, by outbreaks of the disease. It would therefore appear quite probable that the meats in question had been infected.

The disease appeared in both the acute and chronic types, and the symptoms and post-mortem lesions were characteristic of the disease. At the beginning of the outbreak the acute type was most in evidence and more marked in severity, becoming less so with the lapse of time. This no doubt depending upon the virulence of type or strain of infection appearing to become weakened or attenuated with the lapse of time.

The characteristic symptoms in evidence were:—sluggishness, capricious appetite; gumming or adhesion of the eye-lids; accelerated breathing, associated with cough in some cases; the appearance of reddened or purplish blotches on the skin, especially around the region of the ears and neck and the under surface of the abdomen and inner thighs. The bowels in some cases were constipated, while in others diarrhea was present. Progressive weakness, uncertain gait, terminating in loss of power of the hind limbs was frequently noticeable.

In the acute cases the animals rapidly succumbed to the disease, hogs ranging from two to six months in age seemed to be more severely affected and more rapidly succumbed than those older. In the chronic cases, as the course of the disease became prolonged, progressive weakness and emaciation supervened.

Post-mortem lesions were chiefly in evidence affecting the

lymphatic glands, lungs, heart, kidneys, spleen and intestines, The lymphatic glands were usually observed to be markedly reddened and enlarged. The lungs showed many small ecchymosis and large pneumonic areas, dark red in color, consolidated, and sharply defined from the healthy lung. Ecchymosis was also observed on the heart surface. The kidneys were usually darker in color than normal and presented numerous petechia (turkey egg appearance). The spleen in many cases was greatly enlarged, although in a few cases, it appeared smaller than usual. Where the disease had been of short duration, as in acute cases, petechia and ecchymosis were noticed on the outer surface of the intestines and on the inner surface areas of the mucosæ often appeared congested, inflamed and more or less swollen.

In chronic cases, somewhat similar lesions were observed as in acute cases, together with the characteristic ulceration of the intestines, noticeably around the region of the ileo-cecal valve, as well also as thickening of the mucosa in other parts of the intestines.

Reference has been made to a serious affection of swine other than hog cholera, although simulating that disease, as a result of them being fed on kitchen refuse containing certain alkalies.

No doubt the feeding of such refuse containing certain alkalies may be harmful and the cause of serious affections and losses among pigs. However, any affection caused by such alkalies would not be of a contagious nature as was the case in the outbreaks herein referred to, which were essentially highly contagious and characteristic of hog cholera.

The result of our investigations and inquiries showed a close and striking connection between the existence of the disease and the nature of the feeding, furnishing very strong circumstantial evidence in support of the belief that many fresh outbreaks of hog cholera are started in urban and suburban districts by feeding hogs upon uncooked kitchen refuse and garbage containing infected pork or pork products.

*STUDIES ON HOG CHOLERA.

Experimental Hyperimmunization.

BY WALTER E. KING AND ROBERT H. WILSON,

Detroit, Mich.

INTRODUCTION.

Because of the economic importance of hog cholera to the country at large, numerous experimental investigations have been conducted during the past twenty-five years in an effort to determine the etiology of the disease, and to devise a satisfactory method of treatment. These experiments have approached the gigantic problem at various angles and while many of them have terminated negatively, in so far as practical results are concerned, others have been instrumental in shedding more or less light on the subject, and have provided knowledge that is invaluable in dealing with the disease.

The exact nature of the cause is still a problem to be solved. The causative factor is designated as "ultra-microscopic" in character, and the term "filterable virus" is generally used in describing the infectious element with which the disease is produced. Many attempts have been made by animal inoculation and other laboratory methods to study this virus, relative to its specific characteristics, but in most instances the attempts have given futile results. It may be correctly assumed that without more technical knowledge as to the nature of the virus, future investigations will continue to be conducted with more or less blindness and inaccuracy.

ATTEMPTED ATTENUATION OF HOG CHOLERA VIRUS.

During the period that *bacillus cholera suis* was accepted as being the causative factor of hog cholera, investigators attempted to attenuate the organism sufficiently to produce a practical vaccine. Chemicals, heat and various laboratory methods were employed for this purpose, but the results obtained with these experimental vaccines were not entirely satisfactory. In some instances they protected hogs inoculated with cultures of bacillus

* For discussion on hog cholera see page 527.

cholera suis, but in the field, as a rule, failed to protect against natural infection.

When it became known that the specific cause of cholera was involved in the so-called filterable virus, scientific attention was turned to this agent, relative to its modification for preventive inoculation. Practically all of the experimental methods used in the attenuation of bacillus cholera suis have been unsuccessfully applied to the virus. Numerous experiments have been conducted in attempting to attenuate the virus by heating. Dorset and Niles[1] have worked along this line with negative results. Graham[2] of Kentucky also reports unfavorable results with similar experiments. Peters[3] of Illinois claims to have had more or less success with serum virus heated at a temperature of sixty degrees centigrade for one-half hour. He has inoculated over sixteen thousand hogs with this attenuated virus and reports good results in many herds. It is the consensus of opinion, however, that this method of attenuation is not reliable for field use, owing to the difficulty in obtaining a uniform product, and the fact that there is such a variation in the susceptibility of hogs to cholera.

In 1908, King[4] of the Kansas experiment station, published his findings on the attempted attenuation of hog cholera virus by passage through animals of other species, particularly the horse. He concluded, after extensive experimentation, that the virus undergoes some unexplainable modification resulting in an attenuation after several hours residence in the circulatory system of the horse. He noted that during the first two hours residence the virus seemed to become activated in some manner. Typical cases of acute cholera were produced in normal hogs by the injection of two to four cubic centimeters of serum drawn from a horse which had received intravenously a quantity of hog cholera virus two hours previously. Serum drawn at a later period than this seemed to be less virulent, the virulence decreasing in proportion to the length of time elapsing after the horse had received the cholera virus. In 1910 King and Wilson[5] attempted to determine whether or not "horse serum virus," (serum drawn from a horse within two hours after

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[1]Report of Dr. M. Dorset, United States Live Stock Sanitary Proceedings, 1911.
[2]American Veterinary Review, June, 1912, Notes on Attenuation of Virus in the Blood of Cholera Hogs to Prepare a Vaccine.
[3]Report of Dr. A. T. Peters, United States Live Stock Sanitary Proceedings, 1911.
[4]Bulletin, Kansas Experiment Station No. 157, November, 1908.
[5]Bulletin, Kansas Experiment Station No. 171, September, 1910.

the injection of hog cholera virus), represents a mere dilution of the infectious agent. Tests were made to determine this point by preparing corresponding dilutions of the same strains of virus in normal horse blood *in vitro* and also in sterile physiologic salt solution. The proportionate dilutions were made by weighing the horse and taking one-fifteenth of the body weight as representing the total amount of blood in the animal. These dilutions were then kept at body temperature for the same period of time as that which represents the residence of the cholera virus in the circulatory system of the horse. The virulence of each dilution was tested by the injection of normal hogs kept in separate, well isolated pens. As noted above, the serum drawn from the horse within two hours after injection of the cholera virus produced cases of acute cholera within an average incubation period of seven days, and an average duration of the disease of fifteen days. With the same lot of virus in proportionate dilutions normal horse blood and physiologic salt solution *in vitro,* fewer cases of cholera were produced and those which did develop had a longer incubation period, and were more chronic in nature. These tests indicate that horse serum virus does not represent a mere dilution of cholera virus. Table 16 B, from Kansas experiment station bulletin in "Studies on Hog Cholera and Preventive Treatment" gives the comparative results of these dilution tests.

TABLE 16B. SUMMARY, COMPARATIVE RESULTS OF DILUTION TESTS.

	Manner of dilutions of virus.		
	Half-hour horse serum virus.	Corresponding dilutions in normal horse blood incubated half-hour at body-temperature.	Corresponding dilution in physiologic salt solution incubated half-hour at body-temperture.
Number of hogs in series	12	8	6
Average incubation period	6-8 days.	11.4 days.	13.3 days.
Number of hogs recovered	1 (severe reaction.)	4	1 (mild reaction)
Percentage of hogs which died	91.6 per cent.	37.5 per cent.	83.4 per cent.
Average duration of disease	14.8 days.	18.2 days.	19.2 days.
General character of disease	Acute.	Chronic and slight.	Less acute than horse.
General character of lesions	Good.	Slight, not marked.	Fair.

EXPERIMENTAL HYPERIMMUNIZATION WITH HORSE SERUM VIRUS.

PART I. LABORATORY EXPERIMENTS.

The fact that serum drawn from a horse one or two hours after it receives an intravenous injection of approximately one hundred fifty cubic centimeters of cholera virus, is capable, in most instances, of producing acute cholera when injected in small doses into normal hogs, suggested the possibility of substituting horse serum virus for hog serum virus in the production of Dorset-Niles hyperimmune serum. Assuming that a reliable, potent serum could be produced by this modified method certain advantages would follow:

The cost of production would be less than that involved in the present method. The serum from one horse could be substituted for the blood from a large number of virus pigs. This would result not only in greater economy, but in greater convenience and in better regulated manipulations in serum production. Furthermore, more adequate precautions against contamination could be exercised. In comparison with hog blood, relatively large quantities of blood can be drawn aseptically from the horse, defibrinated and kept for a relatively long period.

King and Wilson, in the last bulletin of the Kansas state experiment station to which reference has been made, published the results of some preliminary experiments relative to hyperimmunization with horse serum virus. These results were fairly uniform in character and indicated that the procedure warranted further experimentation. During the past two years the following data has been collected on this project:

PREPARATION OF HORSE SERUM VIRUS.

The virus used in the injection of the horses was in every instance secured from cases of acute cholera in which the symptoms and lesions were characteristic. The moribund hogs were bled from the carotid artery under aseptic conditions. When they were bled the receptacle containing the blood was placed in a refrigerator for ten or twelve hours to allow the coagulum to harden and contract. The serum was then poured into sterile flasks which were placed in the refrigerator pending the time of injection.

The horses used in the work, three in number, weighed approximately eleven hundred pounds each. They were each about nine years old and constitutionally sound. Each was injected and bled four times. The amount of hog cholera serum injected into the horses at a given time varied from one hundred to one hundred fifty cubic centimeters. The injections, in practically every case, were followed by severe reactions, beginning five or ten minutes after the horse had received the virus. The chief characteristics of these reactions were increased respiratory and cardiac movements, stimulation of nearly all the body secretions and marked general depression. The first named symptoms usually disappeared in one hour, leaving the horse more or less exhausted for a day or two. An important feature noted in connection with the injection was that the reactions were usually more pronounced after the first injection, suggesting that the horses become slightly sensitized to the hog serum. However, it appears that a horse may be repeatedly treated with hog cholera virus intravenously for an indefinite period as the three animals used in this work are at present alive and in good condition. The bleedings were made one-half to three-quarters hours after injection, experience showing that serum drawn from the horse at this time is more virulent than that drawn at an earlier or later period. A specially devised apparatus which defibrinates the blood as it is drawn was used in bleeding. About six liters of defibrinated blood were obtained at each bleeding.

VIRULENCY TESTS OF HORSE SERUM VIRUS.

The hбrse serum virus was tested for virulency before being used for experimental hyperimmunization. One or more normal hogs were injected, subcutaneously, each with four cubic centimeters of the horse serum under test. These test hogs were kept in well isolated pens and every precaution observed to guard against extraneous infection. The appended table (I) shows the results of these tests. It will be noted that of the fourteen cases reported in the table only one failed to contract cholera from the horse serum virus. Three or four of the animals developed chronic cases, but all succumbed to the disease, showing typical lesions. The average incubation period was six and two-tenths days and the average duration of the disease twenty days.

TABLE I. VIRULENCY TESTS OF HORSE SERUM.

Hog.	Weight.	Date.	Amount Serum.	Horse.	Results.	Autopsy.
175	46	9/23	4 cubic centimeters.	1313	Symptoms 3 days, Died 15 days.	Typical lesions.
196	55	11/15	4 cubic centimeters.	1313	Symptoms 5 days, Died 19 days.	Typical lesions.
250	44	2/28	4 cubic centimeters.	1422	Symptoms 8 days, Died 30 days.	Typical lesions.
251	48	2/28	4 cubic centimeters.	1422	Symptoms 10 days, Died 27 days.	Typical lesions.
278	60	4/22	4 cubic centimeters.	1423	Symptoms 6 days, Died 20 days.	Typical lesions.
279	56	4/22	4 cubic centimeters.	1422	Symptoms 3 days, Died 13 days.	Typical lesions.
292	80	5/17	4 cubic centimeters.	1423	Symptoms 5 days, Died 14 days.	Typical lesions.
293	80	5/20	4 cubic centimeters.	1314	Symptoms 7 days, Died 14 days.	Typical lesions.
294	75	5/22	4 cubic centimeters.	1314	Symptoms 5 days, Died 16 days.	Typical lesions.
295	95	5/29	4 cubic centimeters.	1422	No reaction.	(Natural immune?)
297	95	6/9	4 cubic centimeters.	1422	Symptoms 5 days, Died 12 days.	Typical lesions.
301	48	6/26	4 cubic centimeters.	1423	Symptoms 4 days, Died 22 days.	Typical lesions.
334	40	12/4	4 cubic centimeters.	1422	Symptoms 12 days, Died 22 days.	Typical lesions.
348	50	11/8	4 cubic centimeters.	1422	Symptoms 6 days, Died 27 days.	Typical lesions.

EXPERIMENTAL HYPERIMMUNES.

Thirteen immune hogs received injections of horse serum virus for the purpose of experimental hyperimmunization. The technique employed in injecting, bleeding and the handling of the serum varied but little from that in use at most of the hog cholera serum laboratories. The intraperitoneal method of injection was used in practically all cases. One-half of one per cent carbolic acid was added to the defibrinated blood as a preservative. Table II, gives the number of experimental hyperimmune hogs, their weight, method of injection, amount of defibrinated blood injected and the number of bleedings.

TABLE II. EXPERIMENTAL HYPERIMMUNES.

Hog.	Weight.	First Injection.		Bleedings.	Second Injection.		Bleedings.
		Method.	Amount, Cubic Centimeters.		Method.	Amount, Cubic Centimeters.	
173	200	Intraperitoneal and Intravenous.	1700	8	Intrap.	1600	4
174	175	Intraperitoneal.	900	8	....	....	......
177	230	Intraperitoneal.	1600	8	Intrap.	1800	3
217	58	Intraperitoneal.	1400	......	Intrap.	800	7
221	300	Intraperitoneal.	2400	3	Intrap.	2200	11
254	200	Intraperitoneal.	2000	....	Intrap.	1000	13
255	190	Intraperitoneal.	1800	....	Intrap.	900	14
272a	140	Intraperitoneal.	1460	10	....	....	....
288	190	Intraperitoneal.	1800	....	....	900	11
289	196	Intraperitoneal.	2000	Died.	....	....	....
290	185	Intraperitoneal.	1800	Died.	....	....	....
291	190	Intraperitoneal.	1800	....	Intrap.	1200	15
296	100	Intraperitoneal.	900	10	....	....	....

Experimental Hyperimmune 173. A Poland China, weight two hundred pounds, immunized by the injection of seventy cubic centimeters hyperimmune serum (Michigan Agricultural College) and two cubic centimeters of virus on September 13, 1910. Fourteen days later was injected with seventeen hundred cubic centimeters of three-quarter-hour horse serum from Horse 1314. Of this amount five hundred twenty cubic centimeters were given intravenously and the remainder intraperitoneally. The hog experienced considerable difficulty in breathing and was otherwise depressed for a few hours after receiving the serum. The first bleeding was made on October 20th, when four hundred cubic centimeters of serum was obtained. The bleedings were continued at intervals of a week until eight bleedings had been made. As the serum from these various bleedings did not protect the test hogs against cholera, it was deemed advisable to give the hog another injection of the horse serum virus to determine if this would increase the potency of its serum. This second injection consisted of sixteen hundred cubic centimeters of horse serum virus given intraperitoneally on February 16, 1911. The next tail bleeding was made on March 21st, followed by three others at intervals of one week. The hog was bled to death on April 19th, eighteen hundred cubic centimeters of blood being obtained at the slaughter bleeding. Post-mortem examination of the hog revealed no pathologic conditions resulting from the injection of horse serum virus.

POTENCY TESTS OF SERUM FROM HOG 173.

Bleeding.	Hog.	Weight.	Date.	Material Injected.	Results.	Autopsy.
1st.	183	56	10/20	25 Cc. serum + 2 Cc. virus.	Symptoms 11 days, Died 32 days.	Cholera lesions not pronounced.
	184	59	10/20	35 Cc. serum + 2 Cc. virus.	Symptoms 11 days, Died 23 days.	Fair cholera lesions.
	185	51	10/20	2 Cc. virus.	Symptoms 5 days, Died 13 days.	Typical lesions.
2nd.	191	52	10/27	25 Cc. serum + 2 Cc. virus.	Symptoms 18 days, Died 21 days.	Typical lesions.
3rd.	191	58	10/27	35 Cc. serum + 2 Cc. virus.	Symptoms 7 days, Died 17 days.	Typical lesions.
	192	53	10/27	35 Cc. serum + 2 Cc. virus.	Symptoms 10 days, Died 18 days.	Typical lesions.
	193	65	10/27	2 Cc. virus.	Symptoms 4 days, Died 8 days.	Typical lesions.
4th.	195	53	11/14	25 Cc. serum + 2 Cc. virus.	Remained well.	....
	210	50	1/4	4.6 gr. dried serum + 2 Cc. virus.	Symptoms 7 days, Died 19 days.	Typical lesions.
	211	55	1/4	6.4 gr. dried serum + 2 Cc. virus.	Symptoms 7 days, Died 21 days.	Typical lesions.
	212	46	1/4	2 Cc. virus.	Symptoms 6 days, Died 8 days.	Typical lesions.
6th.	228	31	1/25	25 Cc. serum + 1.5 Cc. virus.	Symptoms 12 days, Died 18 days.	Typical lesions.
	229	40	1/25	35 Cc. serum + 1.5 Cc. virus.	Symptoms 11 days, Died 16 days.	Typical lesions.
	230	33	1/25	1.5 Cc. virus.	Symptoms 6 days, Died 11 days.	Typical lesions.
7th.	235	50	2/3	35 Cc. serum + 2 Cc. virus.	Symptoms 9 days, Died 18 days.	Typical lesions.
	236	34	2/3	25 Cc. serum + 2 Cc. virus.	Symptoms 6 days, Died 12 days.	Typical lesions.
	233	38	2/3	2 Cc. virus.	Symptoms 5 days, Died 18 days.	Typical lesions.
8th.	247	40	2/22	25 Cc. serum + 2 Cc. virus.	Symptoms 4 days, Died 23 days.	Fair lesions.
1st. After.	256	50	3/21	50 Cc. serum + 2 Cc. virus.	Remained well.	....
2nd inj. Horse.	257	50	3/21	40 Cc. serum + 2 Cc. virus.	Died 4/9	Not cholera.
Serum.	259	48	3/21	2 Cc. virus.	Symptoms 5 days, Died 9 days.	Fair lesions.
3rd.	271	100	4/10	40 Cc. serum + 2 Cc. virus.	Remained well.	....
	273	40	4/10	2 Cc. virus.	Symptoms 6 days, Died 15 days.	Typical lesions.
Slaughter.	283	90	4/28	40 Cc. serum + 2 Cc. virus.	Remained well.	....
	284	88	4/28	30 Cc. serum + 2 Cc. virus.	Symptoms 12 days, Died 30 days.	Fair lesions.
	286	67	4/28	2 Cc. virus.	Symptoms 7 days, Died 11 days.	Typical lesions.

The serum from Hog 173 in most instances failed to protect the test hogs from cholera. It will be noted, however, that the incubation period and duration of the disease were considerably longer in the serum test hogs than in the controls, indicating that a slight resistance to cholera resulted from the injection of the serum.

Experimental Hyperimmune 174. Yorkshire sow, weight one hundred seventy-five pounds. Immunized by the injection of seventy cubic centimeters hyperimmune serum (Michigan Agri-

cultural College) and two cubic centimeters of cholera virus. Two weeks later injected intraperitoneally with eight hundred fifty cubic centimeters of three-quarter-hour horse serum virus. A slight reaction followed the injection as evidenced by anorexia and listlessness lasting a day. First bleeding on October 19th, twenty-two days after receiving the horse serum. Eight bleedings made at intervals of a week.

POTENCY TESTS OF SERUM FROM 174.

Bleeding.	Hog.	Weight.	Date.	Material Injected.	Result.	Autopsy.
1st.	180	58	10/19	25 Cc. serum + 2 Cc. virus.	Symptoms 7 days, Died 17 days.	Typical lesions.
	181	65	10/19	35 Cc. serum + 2 Cc. virus.	Remained well.	
	182	62	10/19	2 Cc. virus.	Symptoms 10 days, Died 20 days.	Typical lesions.
2nd.	187	85	10/26	40 Cc. serum + 2 Cc. virus.	Symptoms 20 days, Died 25 days.	Typical lesions.
	188	62	10/26	30 Cc. serum + 2 Cc. virus.	Symptoms 19 days, Died 24 days.	Fair lesions.
	189	65	10/26	2 Cc. virus.	Symptoms 5 days, Died 5 days.	Typical lesions.
3rd.	204	45	12/19	25 Cc. serum + 2 Cc. virus.	Remained well.	....
4th	205	58	12/19	25 Cc. serum + 2 Cc. virus.	Remained well.	....
5th.	214	50	1/12	25 Cc. serum + 2 Cc. virus.	Remained well.	....
	215	54	1/12	35 Cc. serum + 2 Cc. virus.	Remained well.	....
	216	49	1/12	2 Cc. virus.	Symptoms 6 days, Died 14 days.	Typical lesions.
6th.	222	75	1/24	40 Cc. serum + 2 Cc. virus.	Remained well.	....
	223	58	1/24	25 Cc. serum + 2 Cc. virus.	Remained well.	....
	224	56	1/24	2 Cc. virus.	Symptoms 7 days, Died 12 days.	Typical lesions.
7th.	237	45	2/8	25 Cc. serum + 2 Cc. virus.	Remained well.	....
	238	59	2/8	30 Cc. serum + 2 Cc. virus.	Remained well.	....
	239	48	2/8	2 Cc. virus.	Symptoms 6 days, Died 13 days.	Typical lesions.
	288	190	5/6	75 Cc. serum + 2 Cc. virus.	Remained well.	....
	289	196	5/6	75 Cc. serum + 2 Cc. virus.	Remained well.	....
	290	185	5/12	75 Cc. serum + 2 Cc. virus.	Remained well.	....
	291	190	5/12	75 Cc. serum + 2 Cc. virus.	Remained well.	....
	286	68	4/28	2 Cc. virus.	Symptoms 7 days, died 11 days.	Typical lesions.

With the exception of the first two bleedings, the serum from Hog 174 afforded ample protection to the test hogs.

Hyperimmune (Experimental) 177. A Poland China, weight two hundred thirty pounds. Received immunizing treatment on October 4th, consisting of fifty-five cubic centimeters of hyperimmune serum (Michigan Agricultural College), and two cubic

centimeters of virus. Twenty-seven days later was given intraperitoneally sixteen hundred cubic centimeters of three-quarter-hour horse serum virus. First bleeding made on November 8th. The serum from the first eight bleedings did not prove to be sufficiently potent for practical purposes, so the hog was given a second injection of horse serum on February 21st, consisting of sixteen hundred cubic centimeters of serum. Bleedings resumed one month later. Slaughter bleeding on April 26th.

POTENCY TESTS OF SERUM FROM 177.

Bleeding.	Hog.	Weight.	Date.	Material Injected.	Result.	Autopsy.
1st.	194	55	11/9	25 Cc. serum + 2 Cc. virus.	Symptoms 7 days, Died 21 days.	Slight lesions.
2nd.	197	49	11/16	25 Cc. serum + 2 Cc. virus.	Symptoms 7 days, Died 19 days.	Typical lesions.
3rd.	207	46	12/23	25 Cc. serum + 2 Cc. virus.	Remained well.	....
	208	51	12/23	35 Cc. serum + 2 Cc. virus.	Symptoms 8 days, Died 22 days.	Fair lesions.
	209	43	12/23	2 Cc. virus.	Symptoms 7 days, Died 17 days.	Typical lesions.
5th.	217	58	1/16	35 Cc. serum + 2 Cc. virus.	Remained well.	....
	218	50	1/16	25 Cc. serum + 2 Cc. virus.	Remained well.	....
	219	51	1/16	2 Cc. virus.	Symptoms 5 days, Died 10 days.	Typical lesions.
6th.	225	35	1/24	25 Cc. serum + 2 Cc. virus.	Symptoms 11 days, Died 23 days.	Typical lesions.
	226	55	1/24	35 Cc. serum + 2 Cc. virus.	Remained well.	....
	227	38	1/24	15 Cc. virus.	Symptoms 5 days, Died 9 days.	Typical lesions.
7th.	232	50	2/3	35 Cc. serum + 2 Cc. virus.	Symptoms 13 days, Died 21 days.	Lesions not pronounced.
	233	44	2/3	25 Cc. serum + 2 Cc. virus.	Symptoms 16 days, Died 21 days.	Lesions not pronounced.
	234	45	2/3	2 Cc. virus.	Symptoms 5 days, Died 18 days.	Typical lesions.
1st. after second injection. Horse Serum.	258	45	3/21	25 Cc. serum + 2 Cc. virus.	Symptoms 24 days, Died 34 days.	Typical lesions.
	259	38	3/21	2 Cc. virus.	Symptoms 5 days, Died 9 days.	Typical lesions.
2nd.	272	64	4/10	30 Cc. serum + 2 Cc. virus.	Symptoms 10 days, Died 28 days.	Typical lesions.
Slaughter.	285	52	4/28	30 Cc. serum + 2 Cc. virus.	Remained well.	....
	286	85	4/28	40 Cc. serum + 2 Cc. virus.	Remained well.	....
	287	67	4/28	2 Cc. virus.	Symptoms 8 days, Died 12 days.	Typical lesions.

These experiments indicated that the serum from 177 was lacking in protective properties. The second injection of horse serum apparently failed to increase the potency to any extent.

Experimental Hyperimmune 217. Yorkshire, weight fifty-eight pounds. Immunized on January 16th, with thirty-five cubic centimeters of hyperimmune serum (175—fifth bleeding) and two cubic centimeters virus. On May 3rd received fourteen hundred cubic centimeters of three-quarter-hour horse serum and eight hundred cubic centimeters one month later, no bleedings intervening. The first bleeding was made on July 3rd, and continued weekly until September 1, when the hog was destroyed.

POTENCY TESTS OF SERUM FROM 217.

Bleeding.	Time after Injection.	Hog.	Weight.	Material Injected.	Result.	Autopsy.
3, 4, 5, 6, 7, slaughter.	40, 47, 54, 61, 68 days.	321	55	35 Cc. serum + 2 Cc. virus.	Remained well.	....
		322	45	25 Cc. serum + 2 Cc. virus.	Remained well.	....
		323	42	2 Cc. virus.	Symptoms 5 days, Died 18 days.	Typical lesions.

The blood from all the bleedings of 217 was combined and tested collectively, with the result that both hogs which received treatment were sufficiently protected, while the control succumbed to the disease.

Experimental Hyperimmune 221. Poland China, weight two hundred fifty pounds. Immunized on January 23rd, with seventy-five cubic centimeters serum (174—third bleeding) and two cubic centimeters virus. On February 4th, was injected intraperitoneally with twenty-six hundred cubic centimeters of three-quarter-hour horse serum. The first bleeding was made a month later followed by two others at intervals of a week. A second injection of three-quarter-hour horse serum was given on April 22nd, consisting of twenty-two hundred cubic centimeters. Bleedings were resumed one month later and continued weekly for eleven weeks.

POTENCY TESTS OF SERUM FROM 221.

Bleeding.	Time after Injection.	Hog.	Weight.	Material Injected.	Result.	Autopsy.
1st.	33 days.	253	35	25 Cc. serum + 2 Cc. virus.	Remained well.	....
2nd.	43 days.	259	58	40 Cc. serum + 2 Cc. virus.	Symptoms 12 days, Died 23 days.	Fair lesions.
		260	40	30 Cc. serum + 2 Cc. virus.	Symptoms 11 days, Died 20 days.	Typical lesions.
		261	36	2 Cc. virus.	Symptoms 5 days, Died 9 days.	Fair lesions.
3rd.	....	266	75	40 Cc. serum + 2 Cc. virus.	Symptoms 14 days, Died 35 days.	Typical lesions.
		267	55	30 Cc. serum + 2 Cc. virus.	Symptoms 10 days, Died 30 days.	Fair lesions.
		268	70	2 Cc. virus.	Symptoms 6 days, Died 13 days.	Typical lesions.
1st. 2nd.	After 30 days inj.	296	99	40 Cc. serum + 2 Cc. virus.	Remained well.	....
5th.	62 days.	305	42	40 Cc. serum + 2 Cc. virus.	Remained well.	....
		306	39	30 Cc. serum + 2 Cc. virus.	Symptoms 7 days, Died 26 days.	Fair lesions.
		307	39	2 Cc. virus.	Symptoms 6 days, Died 19 days.	Typical lesions.
6th.	67 days.	308	135	40 Cc. serum + 2 Cc. virus.	Remained well.	....
7, 8, 9, 10 Slaughter.	74, 81, 88, 95.	314	125	40 Cc. serum + 2 Cc. virus.	Remained well.	....
		315	50	30 Cc. serum + 2 Cc. virus.	Remained well. Remained well.	....
		317	125	2 Cc. virus.	Severe reaction recovered.	....

The potency tests showed that the serum from the first three bleedings from 221 was lacking in protective properties. That the test hogs received a degree of immunity is evidenced by the fact that the incubation period and duration of the diseases were more prolonged, than was the case with the controls in the same tests. The second injection of horse serum stimulated the formation of additional anti-substances. It will be noted that the blood from the seventh to slaughter bleedings was mixed and a composite test made, owing to the shortage of hogs at the time.

POTENCY TEST OF SERUM FROM 254.

Bleeding.	Time after Injection.	Hog.	Weight.	Material Injected.	Result.	Autopsy.
2nd.	30 days.	298	77	40 Cc. serum + 2 Cc. virus.	Symptoms 12 days, Died 22 days.	Typical lesions.
		299	64	25 Cc. serum + 2 Cc. virus.	Symptoms 13 days, Died 22 days.	Typical lesions.
		300	60	2 Cc. virus.	Symptoms 8 days, Died 22 days.	Typical lesions.
3rd.	44 days.	309	56	40 Cc. serum + 2 Cc. virus.	Symptoms 8 days, Died 17 days.	Typical lesions.
		310	58	30 Cc. serum + 2 Cc. virus.	Symptoms 8 days, Died 14 days.	Lesions not typical.
		313	46	2 Cc. virus.	Symptoms 5 days, Died 12 days.	Less pronounced.
4, 5, 6.	51, 58, 65	319	47	35 Cc. serum + 2 Cc. virus.	Remained well.	....
7, 8, 9.	72, 77, 84	320	37	25 Cc. serum + 2 Cc. virus.	Remained well.	....
		322	45	2 Cc. virus.	Symptoms 5 days, Died 12 days.	Lesions not pronounced.
10, 11, 12	91, 98, 105	329	65	40 Cc. serum + 2 Cc. virus.	Remained well.	....
13, 14.	112, 119	330	62	30 Cc. serum + 2 Cc. virus.	Remained well.	....
Slaughter.	....	333	65	2 Cc. virus.	Symptoms 6 days, Died 9 days.	Typical lesions.

The first three bleedings yielded a serum that did not afford protection against cholera. Serum from the later bleedings was sufficiently potent to immunize the test hogs.

Experimental Hyperimmune 254. Yorkshire sow, weight two hundred pounds. Received immunizing treatment on March 17th, consisting of seventy-five cubic centimeters serum (Hog 174, fifth bleeding) and two cubic centimeters virus. On April 12th received intraperitoneally eighteen hundred cubic centimeters of three-quarter hour horse serum and nine hundred cubic centimeters May 16th. No ill effects followed these treatments other than a slight soreness, which soon passed off. The first bleeding was made one month after the second injection of horse serum. The hog was bled fifteen times, being slaughtered September 22nd.

Experimental Hyperimmune 255. Yorkshire, weight one hundred and ninety pounds. Immunized May 17th, with seventy-five cubic centimeters serum (Hog 174, fifth bleeding) and two cubic centimeters virus. On April 12th, and May 16th, injected with eighteen hundred and nine hundred respectively of three quarter-hour horse serum. No pronounced reactions were caused by these injections. Bleeding commenced one month after second injection.

POTENCY TESTS OF SERUM FROM 255.

Bleeding.	Time after Injection.	Hog.	Weight.	Material Injected.	Result.	Autopsy.
2nd.	39. days	302	75	40 Cc. serum + 2 Cc. virus.	Remained well.	....
		303	30	30 Cc. serum + 2 Cc. virus.	Symptoms 8 days, Died 28 days.	Lesions not pronounced.
		304	64	2 Cc. virus.	Symptoms 8 days, Died 18 days.	Typical lesions.
3rd.	46 days.	311	62	40 Cc. serum + 2 Cc. virus.	Symptoms 10 days, Died 21 days.	Typical lesions.
		312	58	30 Cc. serum + 2 Cc. virus.	Symptoms 10 days, Died 19 days.	Typical lesions.
		313	46	2 Cc. virus.	Symptoms 6 days, Died 13 days.	Lesions not pronounced.
4, 6, 7	53, 67, 74	316	120	45 Cc. serum + 2 Cc. virus.	Remained well.	....
		317	130	45 Cc. serum + 2 Cc. virus.	Remained well.	....
		318	125	2 Cc. virus.	Severe reaction, recovered.	....
8 to 15	60, 67, 74, 82, 89, 96, 103 days	331	62	40 Cc. serum + 2 Cc. virus.	Remained well.	....
		332	55	30 Cc. serum + 2 Cc. virus.	Remained well.	....
		333	65	2 Cc. virus.	Symptoms 6 days, Died 9 days.	Typical lesions.

Experimental Hyperimmune 272 A. A Poland China stag, weight one hundred and forty-six pounds. Vaccinated April 10th, with forty cubic centimeters hyperimmune serum and two cubic centimeters virus. (Hog 177, third bleeding.) Received but one injection of horse serum (fifteen hundred cubic centimeters) this being May 29th. Was not bled until three months later.

POTENCY TESTS OF SERUM FROM 272 A.

Bleeding.	Time after Injection.	Hog.	Weight.	Material Injected.	Result.	Autopsy.
1 to 10	1st. — 63 days, others weekly.	339	52	40 Cc. serum + 2 Cc. virus.	Remained well.	....
		340	51	30 Cc. serum + 2 Cc. virus.	Remained well.	....
		341	58	2 Cc. virus.	Symptoms 6 days, Died 16 days.	Typical lesions.

This experiment shows that the various lots of serum from 272 A, tested collectively protected the hogs from the virus. This bleeding received but one treatment of horse serum and was not bled until three months later, suggesting that considerable time must elapse between the injection of horse serum and the first bleeding in order to obtain a more potent serum.

Experimental Hyperimmune 288. Yorkshire, sow, weight one hundred and ninety pounds. Immunized to cholera May 6th, with seventy-five cubic centimeters serum (Hog 174 sixth bleeding) and two cubic centimeters virus. Injected twice with three-quarter hour horse serum May 20th, eighteen hundred cubic centimeters and June 22nd, nine hundred cubic centimeters. Bleedings started one month later.

POTENCY TESTS OF SERUM FROM 288.

Bleeding.	Time after Injection.	Hog.	Weight.	Material Injected.	Result.	Autopsy.
1 to 11	1st. — 34 days, Interval of week.	337	72	40 Cc. serum + 2 Cc. virus.	Remained well.	....
		338	56	30 Cc. serum + 2 Cc. virus.	Symptoms 6 days, Died 16 days.	Typical lesions.
		341	58	2 Cc. virus.	Symptoms 6 days, Died 16 days.	Typical lesions.

Experimental Hyperimmune 289. Yorkshire sow, weight one hundred and ninety-eight pounds. Injected May 6th, with seventy-five cubic centimeters (Hog 174, seventh bleeding) and two cubic centimeters virus. Fourteen days later two thousand cubic centimeters of three-quarter-hour horse serum was administered intraperitoneally. On being removed from the table following the injection the hog became violently ill. The hog had been handled rather roughly while being placed on the table and this may have been largely responsible for the severe reaction following the injection. There is also the possibility of the hog having been particularly sensitive to the foreign serum. An improvement was noticed in the animal several hours later, but during the night conditions became aggravated, death resulting on May 22nd, twenty-four hours after treatment.

Experimental Hyperimmune 290. Yorkshire, weight one hundred and eighty-five pounds. On May 12th, injected with seventy-five cubic centimeters serum (Hog 174, seventh bleeding) and two cubic centimeters virus. On May 31st, received intraperitoneally sixteen hundred cubic centimeters three-fourths hour horse serum. Six days later symptoms of cholera were in evidence which rapidly became intensified, the hog dying on the ninth day. Post-mortem examination revealed characteristic lesions of cholera. The death of the hog the ninth day after receiving the large amount of horse serum virus indicated that it

was not immunized to the disease by the treatment of May 12th.

Experimental Hyperimmune 291. Poland China, weight one hundred and ninety pounds. Immunized on May 12th with seventy-five cubic centimeters serum (Hog 221, fourth bleeding) and two cubic centimeters virus. Injected on May 31st, with eighteen hundred cubic centimeters of three-quarter hour horse serum and again on June 30th, with twelve hundred cubic centimeters. No reaction followed these injections. Bleedings started July 29th, and continued at intervals of a week.

POTENCY TESTS OF SERUM FROM 291.

Bleeding.	Time after Injection.	Hog.	Weight.	Material Injected.	Result.	Autopsy.
1 to 7	30 days. Interval of week.	345	70	40 Cc. serum + 2 Cc. virus.	Symptoms 5 days, Died 17 days.	Lesions of chronic cholera.
		346	67	30 Cc. serum + 2 Cc. virus.	Symptoms 6 days, Died 21 days.	Typical lesions.
		347	60	2 Cc. virus.	Symptoms 7 days, Died 22 days.	Typical lesions.

Only the first seven bleedings were tested in this case. As the table indicates the serum was not potent.

Experimental Hyperimmune 296. Chester white, stag, weight one hundred pounds. Injected May 29th, with forty cubic centimeters serum (Hog 221, fourth bleeding) and two cubic centimeters cholera virus. One month later received nine hundred cubic centimeters of three-quarter hour horse serum. Was not bled until August 1st, practically two months after receiving the horse serum.

POTENCY TESTS OF SERUM FROM 296.

Bleeding.	Time after Injection.	Hog.	Weight.	Material Injected.	Result.	Autopsy.
1 to 9	1 to 32 days, Week interval.	343	64	40 Cc. serum + 2 Cc. virus.	Remained well.	....
		344	77	30 Cc. serum + 2 Cc. virus.	Remained well.	....
		347	60	2 Cc. virus.	Symptoms 7 days, Died 22 days.	Typical lesions.

The serum from the various lots of bleedings proved to be sufficiently potent to protect the test pigs against cholera.

TABLE III. TABULATED RESULTS OF EXPERIMENTAL HYPERIMMUNIZATION.

Hog.	Results.	Potency Established.
173	Serum not protent	....
174	Serum protent	60 days.
177	Serum protent	80 days.
217	Serum protent	47 days.
221	Serum protent	65 days.
254	Serum protent	60 days.
255	Serum protent	68 days.
272a	Serum protent	80 days.
288	Potency of serum below standard	34 days.
291	First three bleedings not potent. Others not tested	Not determined.
296	Serum protent	62 days.

SUMMARY OF LABORATORY WORK.

The results of these various laboratory tests relative to experimental hyperimmunization with horse serum virus, suggest the following conclusions:

1. Cholera immune hogs can withstand intraperitoneal injection of large quantities of horse serum virus. Ten cubic centimeters per pound body weight can be injected without subsequent anaphylactic effects.

2. Horse serum virus when injected into immune hogs is capable of stimulating the formation of antibodies in the blood of the treated hogs.

3. Blood drawn from a hog at least one month after it has received an injection of horse serum virus is more potent than that drawn at any earlier period.

4. Two injections (intraperitoneally) of horse serum virus, one month intervening, consisting of ten cubic centimeters and five cubic centimeters per pound weight respectively, appear to produce a more potent blood than that produced by one injection.

5. It requires a larger dose of hyperimmune serum, prepared by this modified method, to protect against the test dose of virus, than is necessary with serum prepared after the original method.

PART II. FIELD TESTS WITH EXPERIMENTAL HYPERIMMUNE SERUM.

In order to determine the efficacy of the experimental serum in immunizing against cholera under natural conditions, a number of field tests were conducted for this purpose. The serum used in these tests had proven potent at the laboratory and included that from bleeders, 174, 177, 217, 221, 254 and 255.

Twenty-nine herds, located in three states, received treatment with the experimental serum. The animals in these several herds afforded conditions which are usually encountered in dealing with an epizootic of hog cholera. The "serum alone" method of treatment was employed in every case.

The following is a description of each herd, together with the treatment and results.

Herd I. This herd, an infected one, was located near Flint, Michigan, and at the time of treatment consisted of two hundred and seventy hogs of various sizes and breeds. The disease had been present in the herd for two weeks, apparently having been introduced by a shipment of hogs received from the Detroit stock yards. Thirty hogs had died and twenty were sick, showing symptoms of cholera at the time of treatment (Aug. 26th). Three of the sick hogs were destroyed and post-mortem examination revealed characteristic lesions of the disease. One hundred hogs were treated with the experimental serum (221). Of this number twenty-two were suckling pigs three weeks old; fifty-two weighed about fifty pounds each; fifteen, one hundred and fifty pounds; and twelve, three hundred and fifty pounds each. The doses were five, twenty-five, fifty and seventy-five cubic centimeters respectively. Thirty-three hogs were left untreated to serve as controls.

The final result of this experiment shows that twenty-nine per cent of the treated hogs died and eighty-four and eight-tenths per cent of the controls. Considering the fact that the herd was badly infected at the time of treatment the outcome of the experiment was quite satisfactory. No attempt was made to isolate the animals in any way during the experiment.

Herd II. Located a few miles from Detroit, Michigan. The herd consisted of fifteen hogs at the time that the disease appeared. Two weeks later the number was reduced to seven. The disease was prevalent on adjoining farms. Six of the hogs weighing fifty pounds each were treated with forty cubic centimeters of serum from experimental hyperimmune 221. The remaining shoat was left untreated as a control.

The control and one of the treated hogs died about a week after the treatment. The other five treated hogs remained well.

Herd III. Located in north eastern Kansas in a vicinity where cholera had been prevalent for several months. The herd consisted originally of thirty-eight hogs, but six of them had already

contracted the disease and died. The remaining number had every chance for exposure, as they were in same pen with those which died. Fifteen thirty-pound shoats and one four hundred-pound sow received treatment consisting of forty cubic centimeters and seventy-five cubic centimeters respectively. Three or four of the treated hogs showed slight symptoms of cholera when injected. Sixteen hogs were not treated. Serum 217 was used on this herd. The last report of the experiment shows that ninety-three and seven-tenths per cent of the treated hogs succumbed and one hundred per cent of the controls. These results indicate that in this experiment the serum had little effect in checking the disease.

Herd IV. Located one mile from herd III. Cholera had been present in this herd for two weeks during which time forty hogs died of the disease. Of the twenty-seven remaining hogs, nineteen weighing approximately seventy pounds each, were given injections of serum (217), the dose administered being forty cubic centimeters. One of these hogs as well as one of the eight controls showed evidence of infection on the day of injection. The final report of this test showed that forty-two and two-tenths per cent. of the treated hogs died and eighty-seven and five-tenths per cent of the controls. The serum evidently gave some protection.

Herd V. Located one-half mile from herd IV. Consisted of sixty-one head of pure bred Poland Chinas of various ages. The herd had escaped cholera, which was present on adjoining farms. Thirty-five hogs, sixteen weighed seventy-five pounds; three weighed four hundred pounds; and sixteen pigs, three weeks old, received treatment (Serum 254), the remainder of the herd (26) serving as controls. Cholera entered the herd soon after the treatment causing the death of eleven and four-tenths per cent of the treated hogs and thirty-four and six-tenths per cent of the controls.

Herd VI. Situated in the same neighborhood as the three preceding herds and free from disease, but in close proximity to it. Fifty-seven shoats were injected, each with forty cubic centimeters serum (255). Forty-one were left untreated as controls. Reports show that this herd escaped cholera, both treated and untreated hogs remaining in normal condition.

Herd VII. Non-infected. Herd consisted of forty-two shoats, average weight, seventy pounds. Owner had visited infected

herd on nearby farm and did not exercise any precaution to guard against carrying the disease to his herd. Twenty-eight of the forty-two hogs received each forty cubic centimeters of serum (255). Two weeks later one of the controls died showing lesions of cholera. Three others were sick at the time, and were destroyed. The treated hogs were in a healthy condition, but owner sold them before completion of the experiment.

Herd VIII. Consisted of seventy-six hogs, mostly spring shoats, weighing sixty pounds. Apparently in healthy condition. Disease present on farm two miles distant. Thirty-eight treated with serum (255) receiving forty cubic centimeters each. The owner reports that the herd is still free from cholera.

Herd IX. Eighty-five head in herd. Hogs had access to water that flowed through badly infected farms, but at the time of treatment they were free from cholera. Forty-two fifty-pound shoats received forty cubic centimeters serum (217); forty-three serving as controls. When farm was visited one month later, all hogs were in good condition. It was reported later that this herd escaped the disease.

Herd X. An infected herd consisting of one hundred and twenty-five sixty-pound shoats, three of which were showing symptoms of cholera. Serum (254) was administered to sixty-three. Two weeks later fifteen and eight-tenths per cent of the treated hogs had died and nineteen and three-tenths of the controls. Owner sold the remainder before definite results could be obtained.

Herd XI. A non-infected herd located one-half mile from cholera. Of the forty-eight hogs in the herd twenty-nine received each forty cubic centimeters serum (217 and 234). When hogs reached marketable age, were sold, the entire herd having escaped cholera.

Herd XII. This herd consisted of thirty-two head, five sows and twenty-seven shoats. They seemed to be in good health, although across the road from where they were kept forty hogs had died from cholera during the previous month. Treated three sows each with sixty cubic centimeters serum (217 and 255) and twenty shoats each with thirty-five cubic centimeters of the same lot. Three weeks later thirty-nine and one-tenth per cent of the treated hogs had died and eighty-eight and eight-tenths per cent of the untreated. The disease appeared in the herd a few days

after treatment, six of the controls dying before any of the treated showed evidence of cholera.

Herd XIII. This herd located one mile from herd XII was free from cholera at the time of treatment. Hogs on an adjoining farm were dying of the disease at the rate of ten per day. Sixty hogs in Herd XIII were injected with the experimental serum (255) leaving seventy-seven as controls. Neither the treated hogs nor the controls became infected while they were under observation.

Herd XIV. A non-infected herd consisting of twenty-two sixty pounds shoats. No cholera within a radius of two miles. Sixteen of the twenty-two hogs received injection of serum (255). Entire herd remained well.

Herd XV. Located two miles from herd fourteen. Cholera had been present in this herd for three weeks and of the original number of hogs (165) only seventy survived and practically all of these showed evidence of infection. Seventeen hogs received treatment, four sows and thirteen shoats with a dosage of sixty cubic centimeters for the former and forty cubic centimeters for the latter (serum 173). Twenty-eight animals which showed no symptoms were reserved as controls. One month later five and nine-tenths per cent of the treated hogs had died and all of the controls. The serum proved of considerable value in this herd.

Herd XVI. In this herd seventeen remained, out of a total number of eighty. Infection had been on the premises for one month. Thirteen of the seventeen were given forty cubic centimeters each of serum from experimental hyperimmune 174. The latest report from this herd shows that both treated and untreated hogs are well.

Herd XVII. This herd consisted of thirty hogs, three of which were sick at the time. The well hogs were placed in new pens and nineteen of them (shoats weighing from thirty to seventy-five pounds) were injected with serum (217). Five weeks later forty-seven and three-tenths per cent of the treated hogs were dead and forty-five and four-tenths per cent of the controls. Most of these hogs died during the week following the injection, indicating that they were developing the disease when treated.

Herd XVIII. Herd eighteen was located four miles from cholera, but the owner intended to transfer the hogs to an infected farm four weeks later. Twenty-four were treated with forty-five cubic centimeters of serum (217) forty-five cubic cen-

timeters being administered to each. Six controls. A report from this herd six weeks later shows that all of the controls succumbed to cholera and one of the treated hogs.

Herd XIX. A healthy herd of sixty-five hogs. Proximity of disease, one mile. Fifty-one were treated with serum (173 and 177). Of this number forty-eight were sixty pound shoats and three were sows weighing about three hundred pounds each. Forty cubic centimeters and seventy-five cubic centimeters were the amounts of serum injected. Both treated and untreated hogs remained well.

Herd XX. These hogs were the property of a cattle feeder and had been purchased from neighborhoods where cholera was prevalent. At the time of treatment they appeared to be healthy. Twenty-nine of the thirty-eight hogs received treatment, which consisted of forty cubic centimeters of serum (177 and 217). The final results of this experiment shows that eighty-eight per cent of the controls were dead and fifty-one per cent of the treated hogs.

Herd XXI. Consisted of sixteen shoats, average weight fifty pounds. Twelve of these were treated each with forty cubic centimeters serum (173). These hogs as well as the controls withstood infection, which was present on adjoining farm.

Herd XXII. In this herd of eight hogs only three were treated, two of which had a temperature of one hundred four and five-tenths degrees Fahrenheit at the time of treatment. Both of these hogs died. The other treated hog and two controls survived. Used serum 254. Dosage, forty cubic centimeters.

Herd XXIII. Infection not present on farm. Treated twenty-four hogs, leaving three as controls. Lot of serum used, 254. This entire herd remained well as long as observation continued.

Herd XXIV. Five hogs treated with serum 253 and 255 dosage forty cubic centimeters. Two controls. Latest report indicates that cholera had not appeared in the herd.

Herd XXV. In this healthy herd of fourteen head, thirteen received treatment, serum 255. The disease was present on neighboring farm. A report from this farm six weeks later showed that all hogs were healthy.

Herd XXVI. Consisted of three fifty-pound shoats. Two were injected with serum (254) dose forty cubic centimeters each. Final result, control dead and both treated hogs well.

Herd XXVII. Fifteen hogs in herd. Two died a few days

previous to the beginning of the experiment. Ten were injected with thirty-five cubic centimeters serum (254). Five weeks later the disease had run its course, with the result that two of the control hogs died and none of the treated.

Herd XXVIII. One hog treated, three controls. Treated hogs received sixty cubic centimeters of serum (254). Result, the treated hog remained well, two of the controls died.

Herd XXIX. Infection one-half mile from this herd. Ten of the hogs were given the serum treatment, a dose of seventy cubic centimeters being administered, (221). The latest report shows that cholera has not entered the herd.

TABLE IV.

TABULATED SUMMARY OF FIELD WORK.

Herd and its condition.	Lot of Serum.	Number hogs treated.	Number died.	Percentage died.	Number controls.	Number controls died.	Percentage died.
I. Infected....	221	100	29	29	33	28	84.8
II. Infected....	221	6	1	16.6	1	1	100.
III. Infected....	217	16	15	93.7	16	16	100.
IV. Infected.....	217	19	8	42.2	8	7	87.5
V. Not infected	254	35	4	11.4	26	9	34.6
VI. Not infected	255	57	....	....	41	....	....
VII. Not infected	255	28	....	....	14	4	28.5
VIII. Not infected	255	38	....	....	38	....	....
IX. Not infected	217	42	....	....	43	....	....
X. Infected.....	254	63	10	15.8	62	12	19.3
XI. Not infected	217 & 254	29	....	....	19	....	....
XII. Infected....	217 & 254	23	9	39.1	9	8	88.8
XIII. Not infected	254	60	....	....	77	....	....
XIV. Not infected	255	16	....	....	6	....	....
XV. Infected....	173	17	1	5.8	28	28	100.
XVI. Not infected	173	13	....	....	4	....	....
XVII. Infected.....	217	19	9	47.3	11	5	45.4
XVIII. Not infected	217	24	1	4.1	6	6	100.
XIX. Not infected	173 & 177	51	....	....	14	....	....
XX. Infected.....	177 & 221	29	15	51.7	9	8	88.8
XXI. Not infected	173	12	....	....	4	....	....
XXII. Infected.....	254	3	2	66.6	5	3	60
XXIII. Not infected	254	24	....	....	3	....	....
XXIV. Not infected	253 & 255	5	....	....	2	....	....
XXV. Not infected	255	14	....	....	1	1	100
XXVI. Infected.....	254	2	....	....	1	1	100
XXVII. Infected.....	254	10	....	....	5	2	40
XXVIII. Infected....	254	1	....	....	3	2	66.6
XXIX. Not infected	221	10	....	....	15	....	....
Totals............	....	766	104	15.7	504	141	27.7

TABLE V.

SUMMARIZED RESULTS OF FIELD WORK.

Condition of Herds.	Number Hogs Treated.	Number Died.	Percentage.	Number Controls.	Number Controls Died.	Percentage.
Not exposed before or after treatment..................	371	....	....	267	....	....
Exposed before treatment and infection evident....	308	99	32.1	191	122	63.8
Exposed, no symptoms before treatment..........	87	5	5.7	46	19	41.3
Total....................	766	104	....	504	141	....

SUMMARY OF FIELD WORK.

A general survey of the field tests, as well as those conducted at the laboratory, indicates that the experimental serum used in this work possessed protective properties. Of the twenty-nine herds treated, thirteen were infected at the beginning of treatment. The disease was of an extremely virulent type in four of these herds, namely Nos. I, III, IV and XII. In the infected herds a total of three hundred and eight hogs received treatment and one hundred and ninety-one served as controls. The final results show that 67.9 per cent of the treated hogs and 36.2 per cent of the controls survived, which points to the fact that the serum had both a prophylactic and curative effect. In the case of the non-infected herds only three of the sixteen became exposed after treatment. More definite conclusions could be drawn as to the value of the serum if cholera had subsequently appeared in a greater number of the sixteen herds.

In the three herds which became exposed to hog cholera after experimental treatment (herds V, VII and XVIII) the average final result is expressed by a survival of 94.8 per cent of treated hogs and 42.7 per cent of controls.

GENERAL CONCLUSIONS.

The practical use of horse serum virus in the preparation of hyperimmune serum is open to question. The method in so far as our results show, has two disadvantages.

First. The animals used for hyperimmunization must be kept under treatment several weeks longer than when treated by the original method.

Second. A larger dose of the serum, as compared with that which is recommended by those engaged in preparing hyperimmune serum according to the original formula, must be administered.

This work has resulted in further experimental evidence that horse serum virus represents an activated hog cholera virus. It would appear scarcely possible to produce hyperimmune serum as relatively potent as has been shown by this work, were similar dilutions of virus in physiologic salt solution used instead of horse serum virus.

*NATURE OF THE VIRUS OF HOG CHOLERA.

By R. R. Dinwiddie,

Fayetteville, Arkansas.

The principal facts with which we are acquainted of the nature of the virus of hog cholera can be sufficiently summarized in a few sentences. We know that it is preeminently present in the blood of the diseased animal; has been demonstrated in the urine, and assumed to be present in all the excretions of the body. It has also been demonstrated to be filterable through bacteria proof earthern filters, consequently classed among the filterable or ultravisual viruses. Although these two terms are often used together, it should be recalled that all filterable viruses are not necessarily ultravisual or ultramicroscopic; rabies is a filterable virus but the Negri bodies which most pathologists accept as the cause of the disease are easily visible.

In the case of pleomorphic organisms the forms which occur at certain stages of development may be small enough to pass the filter and beyond the reach of vision while at other stages of development they may be of relatively large size, not invisible but as yet unrecognized.

Of the hog cholera virus some few other properties have been determined with more or less accuracy. In serum it withstands for one hour a temperature just below the coagulation point—sixty-two degrees centigrade. Blood dried at thirty-seven degrees centigrade is still infectious after being kept for one month in the dark. These data are obtained from my own tests, and are not given as expressing the limits of resistance.

Although there are other well observed features in this disease, such as its extreme contagiousness by cohabitation, the transfer of the virus by other means not so accurately known, the limitation of the disease to one animal species, the apparently absolute immunity resulting from a first attack, and the capability of responding to injections of the virus subsequent to recovery by the development of immune bodies in excess, none of these furnish us

* For discussion on hog cholera see page 527.

with sufficient data to decide the question of the nature of the virus, whether bacterial or protozoan.

DISTRIBUTION OF THE VIRUS IN THE BLOOD.

By the use of the centrifuge in conjunction with an isotonic salt solution, it is possible to obtain a separation of the fluid from the suspended solid constituents of the blood. The washing of corpuscles is now a familiar procedure in all pathologic laboratories in connection with the sero-diagnosis of syphilis, and other diseases, the so called Wassermann tests. Using coagulated defibrinated blood we obtain a separation of serum from corpuscles; with uncoagulated blood a separation of plasma from corpuscles. By subsequent repeated centrifugal washing the blood cells can be obtained practically free from any but negligible traces of the original serum. The serum can be freed from most of the remaining suspended corpuscles by further centrifugation or it can be completely freed from them by filtration through porous porcelain filters.

In studying, experimentally, the nature of the hog cholera virus and its distribution in the blood, I have made use of this method, inoculating to animals the serum and the corpuscular sediment separately. This mode of investigation of an unknown virus has not hitherto been employed, so far as I know, so that in interpreting the results obtained there may be sources of error in connection with it which have been overlooked.* It has led directly to some discoveries which have proven of the highest interest to me at least, and which I cannot but think have an important bearing on the question under discussion,—the nature of the virus of hog cholera.

Although it is possible by repeated centrifugal washing with a sterile salt solution to obtain a sediment which is serum-free, it is a more difficult matter to obtain a serum which is free from corpuscles either in suspension or solution.

Neither centrifugation nor filtration can remove materials derived from the corpuscles which pass into solution in the serum nor particulate objects of the same origin which are capable of passing through the filter. When blood is shed the corpuscles immediately undergo a change of shape, become shrunken and

*Quite recently, though unaware of the fact at the time of my own experiments, I have found that others have made use of the same methods in the investigation of typhus (Goldberger and Anderson, Journal American Medical Association, volume LIX, 7.)

spiney or crenated, and shortly after begin to go into solution in the serum. This dissolution of red blood cells which is little manifest at first becomes exceedingly rapid after forty-eight hours even when kept on ice. It occurs more rapidly among pigs in diseased than in normal blood and for this reason it is impossible to obtain a serum which can be said to be free from the products of cell disintegration occurring after the blood is collected.

In the inoculation experiments which I have referred to, various methods of collection of blood were employed in order to obtain a serum or plasma as free from such products of cell solution as possible. Defibrination of the blood on collection with immediate centrifugation was one method. Another consisted in collection in sodium citrate solution, which prevents coagulation, separation of the diluted plasma by the centrifuge, and this followed by filtration.

In the first experiments the serum and corpuscles were inoculated in equal doses. Later, when it was learned that the corpuscles were always infectious, the object of the experiments was to learn whether the serum or plasma under any conditions of collection could be shown to be non-infectious. I would refer in this connection to the investigations of Theiler in South Africa and of Baldrey in the Philippines, who have found that in rinderpest the blood plasma becomes infectious only after hemolysis has occurred in the red corpuscles.

The details of my experiments bearing on the distribution of the virus in cholera blood, are too lengthy to find a place in this paper; therefore remarks will be limited to a summary of the results obtained and to a discussion of the significance of these results, as I see them.

In all tests which have been made, the serum-free corpuscular sediment has been found virulent. Some of the most acute cases of cholera that I have seen were produced by inoculation with this material. That the virulent agent in these tests was actually derived from the corpuscles and not from some material sedimented with them having its source in the original serum, was shown by other tests, in which the virus when liberated from the corpuscles by laking with distilled water was found not subject to sedimentation by the methods used in this work. The upper layer of the fluid in the centrifuge tubes showed no diminution in virulence after prolonged centrifugation.

As in most cases of the inoculation disease, cultures of *bacillus*

suipestifer were obtained from the internal organs of these animals; they were found in such unusual numbers in smear preparations as to arouse a suspicion that the infection might be purely bacillar, hence, in later tests filtered material was used. The blood cells, after washing, were dissolved in sterile distilled water, then passed through a Berkefeld filter. A further precaution was taken, following Dorset's plan, of penning an untreated pig with those inoculated in order to test the contagiousness of the disease by cohabitation. Although the virulence of the material seemed to be diminished by filtration the filtrate, which was bacteria free, still produced an acute infection which was transferred to other pigs by cohabitation.

The virus of cholera, therefore, is resident within the blood corpuscles from which it is freed when these are dissolved in water.

Contrary to expectation, it was also found that the virus passed from the corpuscles into the salt solution even when there was no visible hemolysis. This was determined by inoculation of pigs with the last portions of the fluid used in washing the blood cells. An acute infection resulted. This fluid could contain no virus derived from the serum for the same reason that the corpuscles were regarded as serum-free, the traces of serum still remaining after ten successive washings being represented by a fraction of a cubic centimeter running into the millions. The virus must therefore have been derived from the corpuscles. This result was obtained in two experiments, one with filtered and one with unfiltered material and I interpret it as meaning that any change in the nature of the surrounding fluid causes a discharge of the virus from the corpuscles.

THE INFECTIOUSNESS OF SERUM.

A serum obtained from blood defibrinated by pressing and straining the fluid from the clot, is virulent, even after removal of suspended blood cells by filtration as is already well known from the filtration experiments of Dorset and his colleagues. Serum naturally expressed by the contraction of the blood clot, and withdrawn after twenty-four hours is clearer and less colored than that obtained by artificial pressure, but this also is infectious after centrifugation and after filtration.

When blood is defibrinated on collection and immediately cen-

trifuged and the serum after dilution with salt solution filtered without delay, we obtain it in perhaps as pure a form as serum can be obtained, but this also proves virulent when inoculated to pigs.

By collection of blood directly into a two per cent sodium citrate solution in physiologic salt solution and subsequent centrifugation and filtration, the fluid part of the blood is obtained in another form free from the changes brought about by coagulation.

The infectiousness of this citrate-plasma dilution has been tested in two experiments. In both of these a mild non-fatal infection resulted. But the blood corpuscles washed with the same solution, dissolved in water and filtered also, in these cases showed diminished virulence compared with unfiltered blood cells which were fully virulent. Filtration of both of these inoculation materials was difficult and slow so that the diminished virulence was probably due to partial retention of the virus by the filter. The fact that an actual infection did occur was manifested by a temporary sickness of the inoculated animals and by subsequent immunity.

We learn from the combined results of these experiments that the virus of hog cholera as it exists in the blood is contained within the blood corpuscles, that is to say, it is intra-corpuscular. It is further shown that, by whatever way we obtain the serum or plasma of shed blood, this also contains the virus. The virulent agent or germ of the disease is, therefore, in its habitat intra-corpuscular and extra-corpuscular.

Assuming that the same condition exists in the circulating blood as can be demonstrated in shed blood we have now to consider what significance these facts possess in studying the nature of the virus. From a certain standpoint they may possess no significance at all, being merely a partial demonstration of the truth of the vague assertion that "the virus of hog cholera probably exists in all the fluids and tissues of the body." The subject might be dismissed in this way if we took the standpoint that the specific germs in the filterable unknown viruses were radically different in their nature from those which have been found in other infections, that is, neither bacterial nor protozoan. But the knowledge we do possess of these viruses and of the diseases they occasion hardly justify such an assumption.

Bacterial pathogenic organisms are not intra-corpuscular in any instance known to us. It is true that some of them are found

within cells. The gonococcus occurs within pus cells and shed epithelia of the urethral membrane and the meningococcus within leucocytes or pus cells in the spinal fluid, while bacteria of any species may be found as phagocytic inclusions. These instances are insufficient to negative the general statement that the pathogenic bacteria are essentially extra-cellular in their growth, and never, so far as known, essentially intra-cellular.

As for the protozoan pathogenic organisms the best known of these are essentially intra-cellular, that is, intra-cellular life is an essential feature of their development. Well known intra-corpuscular organisms are the plasmodia and the piroplasms, the latter occasioning disease in various species of animals (cattle, sheep and dogs). Exclusive intra-corpuscular life is not a feature of any hematozoa, breaking down of corpuscles and liberation of the contained parasite being, indeed, a feature of such diseases. An unknown virus which can be shown to be intra-corpuscular in habitat would for these reasons naturally be considered as protozoan in its nature rather than bacterial.

The evidence supplied by these experiments which I have summarized in this paper indicate that the specific cause of hog cholera is of this nature, a protozoan intra-corpuscular organism.

I admit that no positive assertion of this kind could be based on such evidence alone because the methods employed are lacking in the accuracy which we seek to apply in bacteriologic research, but it supplies us with indications suggestive of the line for further investigation.

HEMATOZOA IN HOG CHOLERA.

The indications furnished by the foregoing experiments naturally led to a more exhaustive microscopic study of the blood of hogs affected with cholera. Special studies of the blood with the aim of detecting intra-corpuscular organisms have been made on specimens from fourteen cholera infected animals. In twelve of these the blood was collected during life from the ear or tail and in two obtained only after death. In fresh, unstained slide and cover preparations made by the usual technique motile organisms were found within the red corpuscles in all of these specimens. My examinations were made with a Zeiss two millimeter apochromatic objective and compensating oculars Nos. 6 and 8, usually with incandescent lamp light. For simple demonstration

of the presence of these bodies any good microscope used with ordinary skill is sufficient. Some on account of their size and motility can even be detected with a dry lens, after one knows what to look for; the light, however, must be good and properly applied.

In size these bodies vary extremely from mere specks only recognizable by their motility up to a long dimension of one-third the diameter of the blood cell. In shape also there is great variability so much so as to excite a suspicion that more than one species of organism may be present.

The prevailing form is that of a disk showing in its movement a circular or short oval outline, alternately with a narrow band or rod-like outline. These disk forms have usually a diameter approximating one-eighth that of the corpuscle which contains them, but may be much smaller than this, and in some of the large forms, one-fourth the diameter of the cell, a similar tendency to this flattened outline may be observed.

A form which is seen in some specimens quite frequently is that of a minute rod which, in its turning movements, shows no change of outline other than that afforded by an end view.

Crescentic shapes may be found in all specimens. Many of these are minute but some are found of a size large enough to allow of their true shape being made out. They are then seen to be made up of two long oval or pear-shaped bodies united at an acute angle at their pointed ends. These forms exhibit sluggish motility.

In rare instances distinctly pear-shaped bodies, two lying side by side, free or connected by a filamentous process joining the pointed ends, have been seen.

The number of infected cells found in blood from the ear ranges from about two to twenty per cent. Cells may be single, double or multiple infected; as many as eight organisms have been seen in one cell. Infected corpuscles are not uniformly altered in size; sometimes they are larger, sometimes smaller than the average. The study of these organisms has been of too brief duration to admit of classification with any certainty.

Some of the forms correspond to the figures of the *piroplasma canis* of Nuttall and Smith. In a few one can see an exact reproduction of the double pyriform bodies of *piroplasma bovis* described by Theobald Smith.

If one should attempt a classification with the data on hand a

provisional designation for these organisms should be *Piroplasma or Babesia suis.*

RELATION TO HOG CHOLERA.

It might be supposed that with the experiment work showing that the hog cholera virus was intra-corpuscular in nature and the microscopic studies showing the actual presence of intra-corpuscular germs, a strong case was made out for the view that these were the specific cause of the disease. The high degree of infection of the red corpuscles which has been seen in some cases of acute cholera, is almost convincing that they are of pathogenic significance. In addition to this is the fact that piroplasmoses in the larger domestic animals, cattle, sheep and dogs, is an acute and often fatal disease. On the other hand, there are obstacles to an acceptance of this view, some of which are apparent and others which are yet to be brought out:

First. In my inoculation experiments with sedimented washed blood cells, no attempt was made at a separation of the different kinds, hence no proof afforded that the virus was contained in the red corpuscles more than in the leucocytes.

Second. My studies have been limited in a few animals all derived from the same locality.

Third. In perhaps half of the cases of hog cholera studied the visibly infected corpuscles have been small, not over two per cent detectable in fresh preparations from the peripheral blood.

Fourth. The most important of all is the fact that similar organisms have been found in the blood of hogs which were not suspected of being infected with cholera. Of these I have examined five, two of which may have had a previous infection of a mild form, and three which were obtained from a farm where no disease had occurred and no suspicion of cholera existed. These three were susceptible to the disease, as shown by later infection tests.

In these normal, or supposed to be normal, pigs, intra-corpuscular organisms were present. The number of infected cells was small, under one per cent in the circulating blood, but their actual presence was thoroughly demonstrated. The forms seen were not to be distinguished from those found in the diseased animals except in their smaller number.

It is evident that unless some explanation of this can be supplied by further investigation these intra-cellular organisms can hardly be regarded as the specific cause of hog cholera.

*THE EFFICIENCY OF ANTI-CHOLERA SERUM AS A CURATIVE AND PREVENTIVE AGENT.

By R. A. Craig,

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For the past three years anti-cholera serum has been used for the protection of hogs against infection with the hog cholera virus, and in the treatment of this disease. The term anti-cholera serum as used in this paper is applied to defibrinated blood to which a preservative has been added; this blood is secured by bleeding a hog that has been hyperimmunized with cholera virus, usually blood from a hog having acute cholera, by injecting it directly or indirectly into the circulation of the animal. The production, distribution and use of this serum is controlled largely by live stock sanitary boards, state veterinarians and state experiment stations. The output of the state laboratories is supplimented by commercial laboratories that are usually located near stock yards where cholera and well hogs can be purchased cheaper than from the farmer.

In the late summer and fall, hundreds of thousands of hogs die of cholera. In 1911 the loss from this disease was very heavy; in one county in Indiana 43,977 hogs, valued at $222,886 died, and in five other counties in the state the loss from cholera was 120,974 hogs, valued at $704,773. The loss in the six counties was nearly $1,000,000.

During the past year but a small percentage of the exposed and infected hogs were protected by vaccination or treated with serum. Thousands of infected, immature hogs were hurried to market, and the loss from this source may be considered about one-half as great as that due to the heavy death rate. Numerous articles describing anti-cholera serum published in the agricultural papers gave the farmers confidence in this new agent for combating hog cholera and the demand for it greatly exceeded the supply. Commercial firms found a ready sale for this serum. Laboratories were made larger and new companies formed. Untrained men established laboratories and began producing serum without the

* For discussion on hog cholera see page 527.

advice of an experienced director. The field results were no better than could be expected. The use of serums lacking potency, "fake" preparations and vaccines and "specifics" have discouraged the use of a reliable serum. In one locality in Indiana anti-cholera serum has not been used, but because of the unsatisfactory and "fake" serums and vaccines with which the farmers' hogs have been vaccinated and treated, anti-cholera serum is condemned.

A short time ago a man who is a very prominent teacher of animal husbandry and who is influential with stockmen stated that his experience with the serum treatment of hog cholera was very unsatisfactory; that within a few days after the treatment was used on the herd in his charge the hogs began dying like flies. In this case the dissatisfaction was largely due to the person in charge of the herd not being properly informed regarding the heavy loss that may follow the treatment of an infected herd. The editor of the live stock department of a prominent agricultural paper states that in his talks with the stockmen he has found that about fifty per cent of them condemn the serum. Many of the farmers in one state do not believe that the statistics stating the field results with serum as given out by the state authorities are true.

The careless testing of serum in order to determine its potency, and recommending too small a dose have resulted in heavy loss in herds vaccinated by the simultaneous method. In testing serum, blood of known virulence and highly susceptible pigs or young hogs should be used. Stock yard hogs, or hogs purchased from two different herds should not be used in testing the same lot of serum, because of the variation in the susceptibility of different lots of young hogs to cholera. The writer has in his possession a letter written by a representative of a commercial company which states that they tested serum without using virulent blood test pigs or without determining the virulence of the blood used. Last year a veterinarian who had trouble with septic infection in a herd of hogs that had been vaccinated sent a sample of the serum that was used to the laboratory; this serum contained strings of fibrin and septic organisms that produced fatal septicemia in rabbits that were inoculated with it.

A large number of the healthy herds in which anti-cholera serum has been used have been given protective doses. The size of the protective dose recommended by commercial companies has varied from five cubic centimeters to twenty-five cubic centi-

meters and by state laboratories and a few commercial firms from twenty cubic centimeters to forty-five cubic centimeters for hogs weighing up to seventy-five and one hundred pounds. The five cubic centimeter and ten cubic centimeter doses recommended for immunizing hogs not exposed to disease was based on the claim that the serum produced by this firm possessed a high degree of potency. However, in districts where hog cholera prevailed, they recommended a full dose of twenty cubic centimeters for fifty pounds of body weight. If a herd of hogs has not been exposed to hog cholera, or is in no danger of becoming exposed to this disease, it is unnecessary to use serum. I have given this scale of doses for the purpose of showing the wide variation. Judging from the field results of the past year, the low doses recommended conferred little or no immunity.

When a non-infected herd of hogs is given serum alone, the immunity conferred is temporary, lasting from four to six weeks. Many of the farmers who had their herds temporarily immunized the past year, believed that the hogs were proof against cholera infection for at least six months, and were greatly disappointed and discouraged when the "vaccinated" animals developed hog cholera. Thousands of hogs that had cost the owners from fifty cents to one dollar per head to have dosed with anti-cholera serum became sick and were shipped to market or died; this has reacted on the control work in some localities.

There are many field conditions that may lead to complications in the simultaneous vaccination work. The natural immunity of a hog may be lowered by feeding, handling, etc., and certain individuals may prove more susceptible toward infection than others. The writer has found that hogs raised in a section of the state where hog cholera seldom occurs make better hogs for virulent blood production that the hogs raised where hog cholera is prevalent every few years. A large number of stock hogs have been shipped into Indiana from Tennessee, Arkansas and Missouri during the last few years; these shipments are usually made during the late fall and winter. Changes in the climate, feed and handling lower the resistance of this class of hogs toward the disease, and this must be considered when vaccinating them.

The Purdue agricultural experiment station distributes serum through the veterinarians. Nearly all of the simultaneous vaccination work is done by the practicing veterinarians, and we direct the work so far as possible. Unless they are in sympathy

with the work and are willing to inform themselves regarding it, mistakes are sure to occur. Vaccination methods must vary so far as the quality of serum used, care of the hogs, and the like because of the different conditions met with in the field. Poor judgment and careless methods on the part of the veterinarian may result in heavy losses. A few days ago we were informed that a veterinarian whom we have been furnishing with serum, mixed the virulent blood with the serum; this practitioner had visited our laboratory and received full instructions regarding methods.

It is not advisable to vaccinate pigs weighing less than fifty pounds by the simultaneous method. If the mother is vaccinated, or infection is present in the pens, the pigs should be given a protective dose of serum, and later given permanent protection or vaccinated by the simultaneous method. The use of blood of low virulence and careless methods used in administering the blood and serum are not uncommon causes of hogs outgrowing their immunity.

Practically all of the vaccination work in Indiana is done in the permanently infected sections of the state. The use of anti-cholera serum for controlling an outbreak of hog cholera in a herd has frequently proven unsatisfactory; in order to prevent the spread of the disease in such a herd. I believe that it is necessary to take the body temperatures of all the hogs that do not show visible symptoms. All hogs having normal temperatures should be vaccinated by the simultaneous method, and if treatment of the infected hogs is advisable, from one-half more to twice the vaccination dose should be administered. If the above method is not practiced, a large percentage of the non-infected hogs may develop cholera later and die, as frequently occurred the past year. Hog cholera virus may remain virulent for months and a few weeks protection is of little help in preventing the spread of the disease.

Up to July, 1912, the Purdue agricultural experiment station had produced about 4,000,000 cubic centimeters of anti-cholera serum. Estimating the average dose of serum used at forty cubic centimeters this quantity was sufficient to vaccinate and treat about 100,000 hogs. We have had a great deal of trouble in securing the proper reports from the farmers, as they do not seem to understand just what we want. Very often they report the entire herd instead of only the animals vaccinated and treated as shown in the report of the veterinarian. This makes the

report useless to us for statistical work. We have received complete reports from more than one-fifth of the hogs treated and vaccinated.

Previous to July 1, 1911, we received complete reports from one hundred and eighty-eight herds: the non-infected herds numbered seventy-three, and contained 4,609 hogs. The loss following simultaneous vaccination was one hundred and four head, or two and twenty-five hundredths per cent. Fifty-one of the non-infected herds had absolutely no loss. There were one hundred and fifteen infected herds numbering 8,071 hogs. The loss following treatment was seven hundred and sixty-six head or nine and five-tenths per cent. Twenty-five of the infected herds had no loss.

For the year ending July 1, 1912, complete reports were received from one hundred and eighty-six herds. Eighty-five herds containing 4,036 hogs had no infection at the time they were vaccinated by the simultaneous method. Thirty-seven, or ninety-one hundredths per cent of the hogs died. All of this loss occurred in ten herds, numbering 1,272 hogs. One hundred and one infected herds, numbering 5,478 hogs were treated. In these herds, seven hundred and one hogs died, or twelve and eight-tenths per cent. In eighty-nine of the infected herds, there were 4,929 hogs of which 1,529 showed infection. The loss in these latter herds was six hundred and seventy-seven head, showing that fifty-five and seven-tenths per cent of the sick hogs were saved. All of the non-infected hogs in the above herds were vaccinated by the simultaneous method.

Practicing veterinarians should realize more fully than at present the importance of the hog cholera control work. We should be slow in endorsing proprietary preparations sold by agents that do not represent a reputable firm. Such persons should not be allowed to make "demonstrations" before our clients, nor should we by any act or statement, lead live stock men to believe that we are willing to recommend any product until we are able to prove that it is worthy of our professional approval. The average practitioner is not in position to test cholera remedies and vaccines, but he can inform himself regarding them by writing to the state or experiment station veterinarians. The hog cholera control work offers an opportunity for us to impress stock men with the necessity of passing better laws for the control of animal diseases, to build state laboratories and add to our reputation as veterinarians.

*HOG CHOLERA SERUM WORK—WITH ESPECIAL REFERENCE TO DISAPPOINTMENTS.

By M. H. Reynolds,

St. Paul, Minnesota.

It is probably quite safe to say that Dorset-Niles serum produced and tested according to standard and accepted methods, in proper dose and properly administered, is an established thing in veterinary medicine; that good serum properly used does give a practical protection from cholera. Abundance of statistics published by reliable men in widely separated portions of the country with different strains of hogs under all possible differing conditions of feed and care, seem to justify this statement.

Our experience in Minnesota has evidently been about the same as that of cholera workers in other states—not invariably pleasant and our results are not by any means invariably ideal. We meet strange experiences in this work; e. g., the same lot of tested serum and virus sent to two different men at about the same time, in different portions of the state, seems to give surprisingly different accounts of itself in actual use. One veterinarian treats by the serum-virus method nearly a thousand healthy hogs for one man with less than two per cent loss; the other man loses seventy-six per cent of a treated herd.

It is our constant policy to tell owners frankly that on a large average, results by the serum-virus method are quite satisfactory and the loss small. We tell them the average loss is small, as compared with possible heavy losses from susceptible hogs in a cholera neighborhood; but we always go a little farther and tell the owner that in occasional cases, fortunately rare, the loss in an individual herd may be very heavy. We give him freely any information he wants and then leave him to operate on his own judgment.

Explanations for disappointments are usually not difficult to find if one can get full information concerning the production, test, and use of serum. In many cases unsatisfactory results fol-

*All discussion upon hog cholera follows this paper.

low when the use of serum has been *delayed* until the herd is generally infected. In such case the serum frequently serves to check the disease for a short time, but subsequent losses may be heavy. Bad results are liable to follow careless handling of the serum, particularly in case of bacterial contamination. A good serum may be shipped from the producing plant and be then kept for days or weeks in a warm express or other office until it has undergone objectionable changes.

Severe losses may be due to the use of poor, untested serum which should never have been sent out. We can only be sure of potency by careful production and conscientious test.

Impotent serum in case of an outbreak may serve no useful purpose in checking the disease and the herd be worse for its use simply because of handling sick hogs. Infected hogs frequently die sooner after the catching and handling necessary for treatment than would have been the case had they been left alone. In such case death occasionally occurs within a few hours after the handling. Such losses would occur just the same whether the hogs were treated with serum or rain water, and would usually occur a few days later even without the handling; but the owner looks with grave suspicion on any such explanation. Or, again, good, fresh serum may be handled and used by a careless or incompetent man in such a way as to give disastrous results when the trouble is all due to unclean surgical procedure.

A year or so ago the writer had the opportunity to visit a large herd, fortunately in a neighboring state, where our serum had been used and unsatisfactory results reported. At the time I saw this herd, the hogs—nearly all of them light shoats—were divided into three lots; the first lot of forty-five had done well, there was apparently nothing wrong with them except an occasional small swelling at the point of treatment. The second lot of about the same size were unthrifty, some of the pigs were evidently badly out of condition, quite a number of them had marked swellings. The third lot was the most unthrifty—the worst looking lot of hogs I have ever seen. Practically every pig had a large swelling and quite a number had died. These three groups had been treated in the order as described. The work was done by a graduate veterinarian and the same serum was used throughout. I was unable to see the veterinarian. The manager of this farm, a very intelligent man, was present only during the treatment of the first lot and thought that the operator had been rea-

sonably thorough in his surgical cleanliness. After the first lot was treated the manager went into another department and saw no more of the work. Information from other sources indicated that the operator had started out with clean instruments and had been careful in his skin disinfection, etc., and had grown progressively more careless and indifferent with each lot treated.

About two years ago two young veterinarians, both well trained, treated by the serum-virus method about three hundred and twenty hogs in three hundred minutes. These belonged to a city garbage feeder whose pens and yards were in the usual condition as we see it at these places. Some fifty pigs were lost out of the three hundred and twenty, to the owner's great dissatisfaction. A careful study of this interesting experience showed that the first lot treated numbered forty-five; these had been kept in a clean pen and fed cooked garbage. There had been no loss in this group and no unpleasant results of any kind. The remaining two hundred and seventy-five pigs were taken from filthy yards, given treatment and put back into the same yards. The same serum was used throughout, and further this same serum was used about the same time on our university farm with the best of results. In addition to this, we have evidence of a very satisfactory serum test for this lot of serum. Autopsies at the garbage feeder's place showed that some of the deaths had occurred as the result of septicemia, there was evidence that some had died from garbage poison, a few had evidently died from inoculation cholera. The larger portion of the loss was probably due to septic infection. Here we have one lot of serum giving first a good test; second, satisfactory results when used in a careful way under favorable conditions on the university farm and in the first lot of pigs treated for the garbage feeder. Later on when the two young men were apparently getting tired and in a great hurry to finish less care was used.

In another instance we sent serum to two different veterinarians at about the same time. One man treated about one thousand hogs for one man, using the serum-virus method, with less than two per cent loss. The other veterinarian treated a small farm herd and lost, plainly from inoculation cholera, something over seventy-nine per cent of the herd, the same serum and the same virus being used in each case.

Where hogs apparently well at the time of vaccination sicken with cholera in about two weeks, the trouble is due to the mis-

take of using poor serum with standard doses of virus or an insufficient dose of good serum with a standard dose of virus. The herd merely develops cholera in two or three weeks in spite of insufficient or impotent serum.

Some dissappointments—possibly more than we have supposed—are due to the use of contaminated virus.

Losses may occur as a result of careless work on the part of the veterinarian. A man may be careless about giving proper doses. He may attempt to economize by using smaller than the directed doses of serum. In other words a man may be incompetent or careless in this work just the same as in any other line of work.

Unsatisfactory results come most frequently perhaps in the cases of farmers who wait too long. Dissatisfaction for which the farmer himself is to blame comes when the farmer insists on treatment by the "serum-only" method of healthy, unexposed hogs after it has been explained to him, as every conscientious veterinarian must do, that "serum-only" treatment with healthy, unexposed hogs gives but very temporary protection.

It should be made evident to owners and veterinarians just as soon as possible, that anti-hog cholera serum is not something which anybody and everybody can use blindly and have good results.

I should like to start some discussion of the general questions as to who should be permitted to use hog cholera serum. We have settled on a clearly defined policy which we are following very closely. Perhaps ours is not a wise policy. This may be a debatable question, particularly in western sections where veterinarians are not so plentiful and where there are large stretches of country with plenty of hogs and serious hog cholera possibilities and few veterinarians.

GENERAL POLICIES.

It seems to me there is opportunity for discussion as to the best methods of distribution of serum especially serum produced by a state institution. In some states serum is produced under state appropriations and distributed gratis to practically anybody who asks for it and to be used by anybody who may be able to get a syringe. Other state institutions have their work started by state appropriations and are maintaining it from the sale of serum,

believing that this is much more efficient method of distributing than the other. As a basis of discussion on this point I will present our Minnesota method, not insisting at all that it is the correct method or the best available by any means. Our serum is produced by the state agricutural experiment station; it was started by direct appropriations from the legislature, for buildings, equipment, etc., and for research work. The routine serum production has since been supported by sales of serum. Our serum is sent out exclusively by express C. O. D. either to owners or veterinarians, but only for use by well trained veterinarians so far as we are able to know and control. During the present year we have restricted still further our distribution of serum for the serum-virus method, limiting it to veterinarians in state employ; *i. e.,* either sanitary board or station. This has been a difficult and embarrassing question for us. There are good arguments for and serious objections to this particular portion of our policy. There are of course plenty of well trained veterinarians, careful men, to whom we would gladly send serum and virus if we were able to discriminate. But a serum producing plant in a state institution like ours can not discriminate in any such way. If we send serum to be used with virus by careful and competent Dr. A we must also send it to Dr. B who may be very careless and unsafe in his surgical method and not the man to be trusted with an agent with such possibilities of harm as virulent hog cholera serum. We adopted this policy only after careful consideration at a joint meeting of experiment station and sanitary board veterinarians. We realized at the time that we were on debatable ground but the weight of reason seemed to be distinctly in favor of the method adopted.

Bad results following use of serum which had stood perfect test; serum which had been used among university farm hogs with results that were entirely satisfactory and used with good results by other practitioners in the state have seemed to force us into this position. On the other hand there may be many farmers having healthy herds in hog cholera neighborhoods. These farmers may be willing and even anxious to immunize their hogs and there may be no state man available for serum-virus work. Serum-only treatment for these healthy unexposed herds gives immunity that is evidently too brief to be practical and leads to useless expense and dissatisfaction in case of subsequent failure to protect.

Such farmers who should have opportunity to have their hogs permanently protected are liable at any time to be deprived of that opportunity. If we refuse to send serum to an incompetent non-graduate, there comes a fine opportunity for owners in general and friends of the non-graduate in particular, to cry unfair discrimination, jobbery, graft. If the untrained veterinarian is the only man available within a long distance and the state is unable to send a man, then farmers are not able to get even serum-only immunity for their hogs.

The pros and cons of discussion on this point could be drawn out at very great length but I trust that this will be sufficient to start a discussion that may clear the atmosphere and show who is right. Our station sends serum for use by trained veterinarians only. Authorities in other states send it indiscriminately to any one who asks for it and has the price. Who is right? May one policy be right and best in one state and a reversal of this be best in another.

Our general method of distribution is given fully in our "HOG CHOLERA SERUM TREATMENT AGREEMENT" which is signed by the owner and attendant veterinarian and another circular "Conditions for Distribution of Hog Cholera Serum," both of which are here submitted and read as follows:

"HOG CHOLERA SERUM AGREEMENT.

"The veterinary division of the Minnesota agricultural experiment station does not guarantee the protection of hogs against hog cholera or any other diseases. Inasmuch as the vaccine is produced as an accommodation to owners the institution assumes no responsibility in vaccination, excepting as to care in preparing, testing, and distributing the serum.

"Figures showing actual results of several years' work are freely given to owners, who must then decide for themselves and assume their own responsibility for vaccination. We are glad to advise as to method, time, etc.

"Excepting in cases which plainly call for unusual action, serum will not be furnished for the serum-virus (simultaneous vaccination method) except by veterinarians in state employ.

"Owners must understand that the serum-virus or double vaccination carries some risk, which, on a large average, is small when tested serum is used in full dose carefully administered and with proper dose of virus. In an occasional herd the loss may be considerable.

"The use of 'serum-only' is safe but should be restricted to recently infected herds and to hogs that will be given plenty of pen exposure at the time or very soon after treatment with serum. We do not under ordinary circumstances advise 'serum-only' treatment of unexposed hogs,

because the duration of protection thus given is usually short. After a few weeks such hogs may take the disease and die.

"This institution assumes no responsibility beyond care in production, testing, and distribution of serum.

"Anyone wishing hogs treated with station serum must agree to these conditions and sign this statement.

Signed......................................

Place........................ Date........................

Countersigned by the veterinarian treating the hogs

Signed.."

"CONDITIONS FOR DISTRIBUTION OF HOG CHOLERA VACCINE.

"Injections to be made in the axilla or on the inner and upper portion of the thigh,—not in the groin.

"Serum may be sent only by express C. O. D., or for cash in advance for use by responsible veterinarians, on healthy hogs, in the early history of outbreaks. Serum can not be accepted for credit on being returned. An order must constitute a sale under all ordinary conditions.

"Veterinarians must agree to not use serum where the disease has prevailed for some time and the herd is already badly infected.

"The serum must be used in *full dose as directed*. Give full dose or none at all. Keep serum cool.

"A report of vaccination must be made and signed. Blanks for such reports will be furnished.

"No vaccination should be done until the owner has first signed the blank (to be furnished) stating that he understands conditions and assumes responsibility. This (owner's blank) is to be returned, together with the vaccination report to university farm, Saint Paul, Minnesota."

Our schedule of doses is as follows, given in full on every bottle of serum sent out:

STANDARD DOSE OF SERUM.

Up to 20 pounds	10 cc.	100 to 150 pounds	30 cc.
20 to 50 pounds	15 cc.	150 to 200 pounds	35 cc.
50 to 75 pounds	20 cc.	Over 200 pounds	40 to 60 cc.
75 to 100 pounds	25 cc.		

"In herds where cholera has made its appearance increase these doses fifty per cent; and for simultaneous treatment with virus for permanent immunity, the above serum dose should be doubled."

VIRUS DOSE.

Up to 20 pounds	0.5 cc.	100 to 200 pounds	1.5 cc.
20 to 100 pounds	1 cc.	Over 200 pounds	2 cc.

Experience has taught us that the margin between serum test dose and the dose to be given in field work should be very wide. In brief our plan for testing serum is to mix all bleedings from a given hyperimmune and use two test pigs for each such mixture; *i. e.,* two test pigs for each hyperimmune. Each receives full dose of tested virus. One test pig receives seventy-five per cent of serum-only dose previously mentioned. The other pig receives full serum-only dose for weight. We ask our serum to protect in the three-quarter serum-only dose. This is practically our test dose. Up to date we have been directing that for field work serum-virus method, serum should be administered in dose equal to one and one-half times the serum-only dose for weight; *i. e.,* fifty per cent increase over serum-only dose or double the three-quarter dose which we require shall fully protect the test pig before the serum is labelled potent. We are now getting out a new dose label and our advice for serum-virus method is use double the serum-only dose instead of one and one-half times the serum-only dose. For use in sick herds we advise an increase of fifty per cent over the standard serum-only dose.

NEEDED INFORMATION.

Those of us who have been in the hog cholera serum work for several years are in a position to appreciate painfully at times the fact that there are many important problems still to be worked out. We need more information concerning conditions affecting potency of serum; information; *e. g.,* concerning the effect of light, heat, presence of red blood cells, stronger preservative, etc. We would like very much to know just what part, if it has any, *bacillus cholera suis* plays in the etiology of hog cholera and in the efficiency of our serum. We need very much a laboratory test for potency. If some one would only work out a reliable laboratory test for potency of serum, he would have the immediate gratitude of all serum workers. Such a test would greatly economize time and expense of producing and do away with the uncertainties and variabilities of individual pigs used for serum test purposes.

ECONOMY OF PRODUCTION.

It would be very desirable, indeed, if we could greatly reduce cost of production. Formerly we used pigs raised and selected

for us by several breeders with whom we made special arrangements. This has given us the color, type, and weight that we prefer. It has given us pigs from dams that were quite certainly susceptible, etc., but it has been expensive. In our later work we have economized very considerably by using stock yards' pigs as virus producers but continuing the especially selected pigs for test purposes. This gives us virus pigs at about one-half of what we have been previously paying.

There is a great waste and one which would seem to be unnecessary in the common failure to utilize the carcasses of virus producers. Some serum plants are rendering virus producers and making tankage, but I think not many. We have found that these carcasses can be quite easily cooked by steam so that they may be crushed and mixed with meal feed. Our hyperimmunes and other hogs were extremely fond of the mixture and it is presumably an extremely good feed for hyperimmunes. However, there appeared a difficulty which we have not yet overcome, that of stinking troughs in warm weather. If hogs could be so carefully fed that they would clean out their troughs thoroughly and these troughs could then be sunned and dried or possibly washed out in warm weather, it would seem that this difficulty could be overcome.

DISCUSSION.

Dr. Meyer: I am very much interested in the different papers presented this morning, particularly the facts stated by Dr. Dinwiddie which are of great importance for further progress in the understanding of the etiology of hog cholera. These experiments have been conducted on similar lines as ours, which also aimed to disprove the statements of Hutyra that hog cholera virus is found only in the serum. For the last sixteen months we have experimented on the farm of the state live stock sanitary board and have succeeded in demonstrating that the blood corpuscles of a virus hog retain their property in producing hog cholera, when washed ten or fifteen times with saline solution. The technique used was similar to that mentioned by Dr. Dinwiddie. A centrifuge with four thousand revolutions was used. Such virus experiments are extremely intricate and difficult, because hog cholera is highly contagious compared with other diseases, due to filtrable virus with which such experiments have to be conducted, and, without the necessary precautions, absolutely misleading results may be obtained. We have repeated all experiments with different virus (locality, district and polyvalent) and always we procured the same results; namely, the virus is attached to the blood cells.

I am not prepared to make a statement that the virus is *in* the red blood cells, as comparative observations with African horse-sickness have proven that the virus is only fixed on the surface of the red blood corpuscles.

Dr. Dinwiddie mentioned that practically all piroplasma are intracorpuscular. Our studies on East Coast Fever have shown that this is not the case. The piroplasma are attached to the red cells without causing any alterations in the cells and therefore no signs of anemia will be noticed. Here similar conditions may be observed when studying microscopically, an oil-limesalt emulsion; the lime particles are attached to the fat globules purely by their membrane actions.

We have extended our investigations into the biologic nature of the hog cholera virus in using different methods of filtration. In the first place, we filtered serum free from corpuscular elements through Chamberland candles F and B; also Pukal filters were used and we found that a virulent filtrate was obtained in a dilution of two to one hundred. In a dilution of thirty-three to one hundred the virus will not pass a Chamberland candle B, but will very nicely pass this filter in a dilution of one-half to one hundred. Further experiments were elaborated to demonstrate that the hog cholera virus will pass through colloid filters prepared according to the methods of Giemsa, Von Prowazek, Bechtold and others. These filters are prepared in coating Berkefeld or Pukal filters with colloid substances (one-third per cent solution of agar, collodium, celloidin, [Schering]) and gelatine. We noticed that by successive inoculations the virus would pass in a dilution of two to one hundred a one per cent agar colloid membrane, but not a three per cent agar, nor a collodium or celloidin membrane.

These experiments have been carried out with a suction pump and at present repeated with the pressure pump; namely, according to the laws of physical chemistry there is a difference whether celloids are sucked through the fine pores or pressed through these colloid membranes. The preparation of the colloid filtres has to be carried out most carefully; otherwise the presence of small air bubbles in the coating films will naturally prevent an absolute ultra filtration. These experiments are still in progress, but we hope to prove that we are dealing with a filtrable virus.

Besides these investigations into the true hog cholera due to a filtrable virus, we conducted experiments to determine whether we have in Pennsylvania also diseases (Salmonelloses) of hogs of similar fatal character and not due to the filtrable virus, but to the well known hog cholera bacillus or closely related bacteria. Recent publications from Germany, particularly those of Damman-Stedefeder, Glaessner and others, have shown that a bacillus belonging to the group of the typhoid-paratyphoid bacilli, the *bacillus typhosus suis* (swine typhoid) and the *bacillus paratyphosus suis* (Voldagsen) may cause a disease in hogs anatomically absolutely identical with hog cholera.

We have isolated, from about fifteen outbreaks reported in the upper part of Pennsylvania, the microörganisms in the organs of the hogs dead from what was anatomically diagnosed as hog cholera. We came to the conclusion that the *bacillus suipestifer* or the *bacillus paratyphosus* B. are

frequently absent and that other organisms like the bacillus coli A. and B., the enterididis (Gaertner), pyocyaneus and suisepticus are found. It is possible that we may in the future be able to find the bacillus typhosus Suis, (Bacillus Voldagsen), etc., in some of the outbreaks. The distribution of the bacteria in the organism, and their relationship to the epidemic, varied considerably and had a significant effect on the seriousness of the outbreak. We had lately several cases in which from practically every organ of about ten hogs examined, the bacillus pyocyaneus was found constantly.

These bacilli had naturally to be identified biologically and extensive work was carried out on these lines by means of the agglutination tests. I mention these experiments here because it was mentioned this morning in connection with the hog cholera outbreaks in Canada that sausages in garbage are considered to be carriers of the hog cholera infection. I would suggest that investigations into the types of bacteria found in the animals of such hog cholera outbreaks in Canada, be conducted on similar lines as mentioned above, should not other experiments have proven that the filtrable virus was responsible for the outbreaks. All these problems have naturally been studied extremely superficially and the minute detail work, with all its practical application, still stands before us. It would be advisable that a committee be selected to study in the United States the nature of hog cholera and its relationship to public health.

Experiments have been conducted in Germany on many different lines which have absolutely not been considered in the investigations of hog cholera in the United States, and it would be advisable to check up the results from abroad. I may only mention here that the question of natural infection of hog cholera, the distribution of the virus, and the resistency have been studied in only a few incomplete experiments. For example, the contents of the intestinal tract when filtered is only virulent under conditions which still are unknown. Decomposition destroys rather quickly the otherwise resistent virus. The observations that garbage may disseminate hog cholera, as mentioned in the paper of Dr. McGilvray of Canada, should therefore be studied bacteriologically and on broad animal experimentation. I am sorry to note that my time is so limited and that I cannot extend myself on the question of the value of the hog cholera serum.

Dr. Salmon: The remarks made by my friend, Dr. Connaway,* in regard to Salmonellosis lead me to say a few words in regard to the early investigation of this disease, which I believe establish certain facts which still have a bearing on its control. I do not believe that because a filtrable virus has been discovered which undoubtedly causes a disease, you can wipe off of the blackboard all the experimental results which were previously made and which showed the pathogenic character of the hog cholera bacillus and its most constant association with that disease. You know that Salmonellosis is not a new term, that it was given to this group of bacilli some ten years ago by my friend Professor Lignieres, of Buenes Aires, perhaps without sufficient reason, because I

* Remarks not submitted for publication.

have never claimed to be the discoverer of that bacillus. It was discovered and worked up by Dr. Theobald Smith and his assistants in the bureau of animal industry under my supervision and direction. In disclaiming the discovery of the germ I do not want to be understood as lacking in appreciation of the value of this work. I should be pleased to be able to claim it as my own if entitled to the claim because I believe it was valuable work and that it will stand.

The experiments made in Germany from time to time, and especially those made since the discovery of the filtrable virus, confirm this earlier work and prove to my mind that the bacilli of the hog cholera class that have been grouped together as Salmonellosis produce a disease which has contagious properties. There is a tendency, I think, to discard the results of all those early investigations and to accept only the conclusions in regard to the filtrable virus. It is too early to assume such a position. My reason for believing this is, first, the association of those bacilli in all countries, in all years, and in nearly all outbreaks with the disease; and, second, that the hog cholera bacillus is a pathogenic bacillus that produces a disease than can be communicated, not only by inoculation but apparently by cohabitation. It was proved beyond any question, I think, by the experiments of De Schweinitz that the serum developed against the bacillus of hog cholera had a very important protective effect in the herds where it was used, saving more than fifty per cent of the animals in many infected herds.

I do not believe that fact can be brushed aside as merely an accident. I believe it proves that hog cholera bacillus has some effect in association with this filtrable virus, and that when the bacilli are present in a herd and have acquired virulent properties they are capable of making the serum that is now being used give bad results; because the filtrable virus undoubtedly makes it possible for the hog cholera bacillus to penetrate and grow in the animal tissue, and I have no doubt the growth of this bacillus within the tissues and the toxic substances which we know it produces have a most unfavorable influence upon the course of the disease.

Perhaps the difference in the virulence of the hog cholera bacilli—and we know they may differ much in various outbreaks—at least partially explains the unfavorable results which are from time to time obtained in the effort to protect herds by the injection of serum or of serum and virus.

The failure to discover the filtrable virus in the earlier investigation should not be accepted as a reason for discrediting the work done at that time. The subject was a difficult one and filtrable viruses were then unknown. It was not only our laboratory which was working on hog cholera at that time, but the laboratories of the various state experiment stations, and the principal European laboratories, and they did not go one step beyond our results. I believe if it had not been for De Schweinitz' work in trying to prevent the disease with his anti-hog cholera bacillus serum it might have been years yet before we discovered the filtrable virus.

The anti-hog cholera bacillus serum did, to a certain extent, prevent

the disease but there were certain outbreaks in which it had no effect, and it was this fact which led De Schweinitz to search for and discover another etiologic factor. We knew in the bureau of animal industry even before this discovery was made that the etiology of hog cholera was not entirely cleared up and Dr. Moore and I often talked over the subject, admitting that there was something in addition to the hog cholera bacillus, that there was some element we had not yet gotten hold of. It was De Schweinitz' work in Iowa that made possible this valuable and brilliant discovery of the filtrable virus and the further discovery of a serum which protects against the virus and finally of the simultaneous use of serum and virus for the production of active immunity methods which have been so ably developed by Dorset and Niles, and with which you are now working for the prevention of the disease.

DR. KINSLEY: I am certain we have all enjoyed this symposium on hog cholera. I heartily agree with Dr. Salmon that we should not abandon the old theories to accept the new until the foundations are well laid. I was particularly interested in the paper by Dr. Dinwiddie and the discussion by Dr. Meyer in relation to the protozoan cause of hog cholera; and am wondering how long it will be until they can positively prove that the bodies described by Dr. Dinwiddie can be found in healthy as well as in diseased hogs. Is it not possible that such protozoan bodies might be found in healthy hogs? These men who are doing this high grade technical laboratory work should be encouraged to go on and make positive proofs of their findings. For we are contending with some things in hog cholera that are not understood by anyone, and only through these laboratory efforts will these various problems be solved.

DR. HIGGINS: I have been very much interested in this discussion. There are, however, some features open for further elucidation. I wish to ask a few questions, and hope those who are conversant with the details will give us what they can for answers. What danger is there in disseminating hog cholera through the medium of fresh or salted pork products prepared from hogs affected at the time of their slaughter with the disease? I think some of you men who are dealing every day with hog cholera and serum treatment may be able to answer. I believe it is a common practice to ship hog cholera hogs to the slaughter house and get them into pork as soon as possible before they all die. As to the life of the infection outside of the body I may offer a possible answer. It was determined after considerable discussion and consideration by Dr. Rutherford, the late veterinary general of Canada, that probably it would be safe to quarantine premises for three months after an outbreak of cholera and after killing the hogs. I believe I am safe in saying that three months has in every case—assuming adequate protective measures have been carried out—been sufficient to quarantine. In no case where the instructions of the branch have been carried out has hog cholera appeared.

The infection carriers—do they exist? If so, is not the hog cholera treatment by serum alone, or serum simultaneous treatment, just keeping alive the fire that it may blaze up at any moment? Or, is there a direct

possibility of eliminating the hog cholera by this method? Is it a step in advance or is it playing with the disease? Dr. Meyer has mentioned the filtrable virus. We have proven in Canada that we have the filterable virus, and I believe our diagnostic methods are such that in no case where we have dealt with hog cholera have we been dealing with bacillus enteritidis. I must congratulate Dr. Dinwiddie on his work. Even though it may in future be shown as a possible error, I think we must congratulate him at the present time in going ahead, and personally I shall do my best to check some of his work in healthy hogs. We have them in Canada, I think, more frequently than you do in the States; our outbreaks are infrequent and isolated.

Dr. V. A. Moore: I wish we had time for Dr. Salmon to reveal to you some of the unwritten history of the earlier work of the bureau that the facts could be brought out in regard to the experimental work that was done and with the serum Dr. Salmon has referred to. I want to add this one significant fact, that in the early work of the bureau in very serious outbreaks in Iowa, Illinois and other states the hog cholera bacillus, as we then understood, could not be found, whereas, in other outbreaks, especially in the eastern part of the country, they were invariably found. Dr. Salmon and I have often talked over this matter and agreed there was a hidden virus or agent somewhere that had something to do with the disease.

I have been very much interested in these papers, and I am yet uncertain as to how the disease is spread. In New York, where the disease is not as prevalent as in other places, we do have this disease and have heavy losses in many places, often times in connection with garbage fed hogs. The question is: How does the garbage carry the infection? We have instances in the last few years where the garbage has been cooked and where, it seems to me, the carrying of the virus through scraps of uncooked meat was out of the question. Although the garbage was cooked and mixed with ground feed, yet the disease has occurred, and quite frequently. So we have the trying question before us of the dissemination of this virus.

Another question I wish Dr. Connaway would answer is how to make the diagnosis. We know the characteristic symptoms and lesions, and we also know certain of these exist in connection with other diseases. How are we to tell?

Dr. Babb: Dr. Connaway spoke of sending out his laboratory men for the purpose of making diagnoses and studies of the disease. Are they graduate veterinarians?

It is generally understood that it is his custom to send out agricultural students to handle virulent blood in such work. I would like to take the opportunity of offering a suggestion regarding some ideas I have evolved from reading and thought only, though never having had an opportunity to carry out investigations on the subject. I have a theory regarding the filterable virus, what it is, not only of hog cholera, but of a number of other diseases which we refer to as caused by filterable virus, that is: that it is a liquid product, not a bacillus nor even an animal organism, but a liquid product from the cells of the animal

tissues. I am wondering if some work could not be done along the line of finding out if that is so, not only in hog cholera, but perhaps even in rabies and several of the diseases of the human family that are said to be caused by the filterable virus.

Dr. Dinwiddie: As to the danger of getting infection by the use of products from the packing houses, I will say this: At the University of Arkansas the products used in the dormitories are obtained partly from the packing houses and partly from local sources. We found that the farms using garbage from the dormitories were almost continually affected with hog cholera. Five or six years ago the breeding stock of the college was almost decimated with hog cholera, and the infection was attributed to dormitory swill.

As to the question of communicating the disease by ingestion, it is necessary in order to decide this question to feed filtered virus. We have all seen hogs sicken and die from feeding the viscera of other diseased hogs, but in this case we are feeding along with the actual virus of cholera, the bacillus suipestifer. I might mention in this connection that I made an experiment or two recently in testing the possibility of getting hog cholera by ingestion of filtered virus. I used the blood cells, dissolved them in thirty parts of water and filtered them through a Berkefeld filter. I also used the serum and filtered that as well as the last washing fluid of the blood cells. I forgot to mention in my paper that the last washing fluid contains the virus as well as the serum does. I mixed these together and fed them to three pigs; all died from cholera. One took sick in three days, another in seven. When the pigs were transferred to another pen I found ulcers all over their bodies, and came to the conclusion they became inoculated through these ulcers.

I repeated the experiment with two other hogs where there were no lesions of the skin, feeding them the filtered virus and they did not contract cholera. After about three weeks I inoculated them with the same virus that had been used before and they promptly contracted cholera. That leads me to think that hog cholera is not so frequently contracted by ingestion as is generally supposed.

Dr. Mayo: For the past three years I have fed a hundred pure bred hogs on what the boys call "growley," that is table scraps from the mess hall where five hundred students eat, and where packing house products are used almost exclusively, and have only lost three hogs in that period, and that was from accidental poisoning.

Dr. Meyer: In one experiment we made in treating four hogs with hog cholera virus it was given in capsules. The hogs died.

Dr. Reichel: I am in a position to observe the development of hog cholera in susceptible hogs injected with pure strains of hog cholera virus. The most virulent strains cause a rise in temperature in about the sixth or seventh day and if death follows quickly, lesions usually observed in hogs dead of cholera as a result of a natural infection are seldom seen. Death in these instances is due to the virus in its purest form without the influence of the secondary bacterial invasion.

Stimulated by Dr. Reynold's report last year on the vaccination of young

pigs with virus we set aside almost two hundred young pigs born from natural immune, immunized and hyperimmunized sows and injected two cubic centimeters of virulent blood or virus into most of them. A very high percentage of the controls subsequently died as did the vaccinated pigs after they had reached five or six weeks of age. Most of the deaths were due to hog cholera, but many of the pigs that seemed to do well for a time gradually took on a rough appearance and died. Autopsies revealed lesions such as chronic ulceration in the intestinal tract, petechial hemorrhages of the kidneys and pneumonias, caused by the secondary bacterial infections. From our bacterial examinations we were led to believe that the bacterial invasion responsible for the lesions and death, occurred in pigs apparently immunized against hog cholera virus. No attention is paid to the secondary infections in combating outbreaks of hog cholera at the present time.

Owing to the large number of pigs and conditions no accurate data could be kept to justify a summary of the value of virulent blood vaccination.

Dr. Ranck: I am not in practice but have charge of the distribution of hog cholera serum in the state of Mississippi, and have the interest of every hog raiser at heart in a country where we are afflicted with a trouble that in certain parts of the state has practically paralyzed one phase of agricultural industry. Our people are turning their attention to stock raising, and as they consider the hog the salvation of that part of the country, they seek advice from us as state officials and ask us what to do. We tell them that hogs can be protected against hog cholera by serums if it is properly applied. We find that there are a number of commercial houses seeking to distribute nosfrums, and in some instances serum, which have been proven ineffectual. They seek advice from different sources and very frequently this advice is misleading.

We believe that this is sufficiently important to us in the south to prompt us to urge this Association to appoint a committee similar to the commission appointed to investigate tuberculosis in lower animals. Let this commission have in mind the establishment of concise and definite information so that we, as sanitary board officials, would have a definite line of educational data to give the people who are seeking information on this point.

Dr. McGilvray: I would state that corn is not fed to hogs in Manitoba. In the case of those who doubt the possibility of hog cholera being caused by feeding refuse containing certain packing house products I may say that when healthy hogs were introduced on to these premises or came into contact with hogs affected with the disease that they likewise became affected.

Dr. Craig: We do not know how many small tankage firms are setting up in business over the country, but we know where the stock comes from that goes to these small tankage firms and that there is an opportunity for the infection of the tankage after its removal from the tank, that all of this tankage does not go into fertilizer, but, on the other hand, some of it goes to the hog breeders for feed. In Indiana state hog cholera is largely spread by importing diseased hogs from the

stock yards and other outside sources. Where we deal with an outbreak in a county twenty-five miles square and where 43,000 hogs die in that county in one year there is no mistake that this is an infectious disease.

Regarding stock yards as an avenue of infection I may state that during the last few years there have been a number of small stock yards started including one at Evansville, one at Lafayette, and one at Logansport. Infected hogs go into all these yards and infected hogs and exposed hogs go from there into the surrounding country. The outbreak above referred to was due in a large measure to stock yard hogs that were taken from those infected yards and in that way spread the disease throughout the county.

Dr. Klein: I would like to ask Dr. McGilvray if in the outbreaks he reported the disease broke out simultaneously in practically all the premises where it occurred, or whether it started in one or two places and spread from those centers to the other farms?

Dr. McGilvray: It seemed to make its appearance almost simultaneously or in rapid succession on different premises in the district of Winnipeg. It made its initial appearance on premises where garbage, containing certain packing house products, was being fed to the hogs spreading from these centers to other surrounding premises and the disease in these latter cases was usually traceable to an interchange of hogs or some other means of contact or exposure. An effort was made to determine the source of the pork products and I assure you that in all cases we found these pork products to be of the same brand and origin. In searching the garbage, pieces of pork, each having the same brand thereon, could easily be detected and the same results were obtained in other outbreaks which occurred several hundred miles distant from Winnipeg.

Dr. Burson: We know that certain hogs or carcasses of hogs afflicted with this disease are passed under the various food regulations for food purposes and this should be born in mind in connection with the work Dr. Dinwiddie has done in his efforts to demonstrate the intracorpuscular element; again, we know also that ordinary salting of meat does not destroy all kinds of disease germs. When we put these facts together we can, I believe, realize that Dr. McGilvray has very good reasons for the statement he has made in his paper. I have no doubt that pork products under certain conditions are the cause of the spread of this disease.

As a representative of the profession from the southern states—I am located in Georgia—I desire to say that I believe the problem of the control of hog cholera with us is a much more serious proposition than in the north, where sanitary conditions on the farms are vastly superior and where the farmers as a class are a better and easier lot to deal with. Open range conditions exist in fully one-third of the state of Georgia; the farmers know very little about the disease, and as yet practically nothing about serum. The results of both commercial serum and that made under my own supervision have thus far been very satisfactory.

In regard to the proper distribution of serum we are unable to do as

we would wish. I believe in the district system and in placing graduate veterinarians, trained in laboratory work in charge of the districts to administer serum for I am convinced that we cannot depend upon the ordinary country practitioners with but limited experience in post-mortem investigations and who oftentimes think hog practice is beneath their dignity.

DR. WHITE: Being interested in directing live stock sanitary control work in a southern state, I came here this morning to gather information in regard to controlling hog cholera by the serum treatment. I have certainly had my ear to the ground for any points of value in regard to this serum and concerning control of hog cholera by its use, but from what I can gather from the papers and discussions which we have listened to, it resolves itself into the question of the impossibility of controlling hog cholera by the use of anti-hog cholera serum as made and used at the present time. I mean by that that if we control and eradicate the disease we must confine our efforts as heretofore to blocking the avenues of infection and not depend so much upon the protection afforded by anti-hog cholera serum as we have formerly been led to believe. From the discussions I have listened to as offered by men most interested and in position to know, more hog cholera is being scattered than eradicated according to their own testimony and especially is this true where virulent blood has been used—serum simultaneous method. Evidently we must continue to block the avenues of infection and go ahead with the work for a while, at least, in about the same way we have been handling outbreaks heretofore.

In Tennessee there is no doubt but that a large majority of our outbreaks of hog cholera can be traced to public stock yards. Every public stock yard in the state and every other state, for that matter, is infected with this disease and consequently no hog should ever be removed from a public stock yard for breeding or feeding purposes. In Tennessee we have put all public stock yards in permanent quarantine in regard to the handling of swine, and when a hog goes into one of these yards it must go direct to the abattoir for immediate slaughter. We have found that the turkey buzzard is a great disseminator and spreader of hog cholera and for that reason advise our farmers to bury all animals which die on their premises. If hog cholera infected carcasses are devoured by buzzards the buzzards will carry the infection for miles infecting cholera free farms. Of course, there are other avenues of infection and I believe we should keep an eye open to methods of blocking these channels and in that way control outbreaks, as we cannot depend much at the present time, at least, on controlling this disease by the use of anti-hog cholera serum.

DR BECKER: I should like to ask this body how it expects to get a serum to immunize hogs from hog cholera when they are at such variance as to the etiologic fact. I would like to know how we as veterinarians get around the Theobald Smith phenomena of anaphylaxis?

DR. ROGERS: It appears to be pretty well settled that for the present at least we have got to depend largely on the use of anti-hog cholera serum. I rather hoped Dr. Craig would state with some authority what

we can consider the proper line of serum. I for one would like to go out of this meeting feeling that some one who knew had given me a fairly clear idea, first, of how much serum to use for a seventy-five to one hundred-pound hog; secondly, what I should consider as exposure.

DR. CRAIG: I can answer that question regarding our own serum. We recommend a dose of one-half cubic centimeter per pound of body weight up to eighty pounds; for a hog weighing one hundred pounds we recommend about forty-five cubic centimeters; up to two hundred pounds, sixty-five cubic centimeters, and up to three hundred pounds, about ninety cubic centimeters. We usually do not recommend a simultaneous dose larger than ninety cubic centimeters. When you are vaccinating a large hog that is valuable, a breeding hog, it may be advisable to use a large dose. Very often the practitioner has used from one hundred and twenty to one hundred and fifty cubic centimeters for a hog weighing six hundred pounds.

I would consider the bringing of hogs from the stock yards or hogs that have been shipped in stock cars to farms an exposure to the hogs on that place; again, I would consider the buying of a hog from an unknown source an exposure until I had proved by quarantine measures that it was not infected. We recommend that every hog bought from an unknown source be quarantined for three weeks before allowing it to come in contact with the other hogs.

DR. ROGERS: Take for example, a farmer having hog cholera on his farm, another farmer within three miles distant owns a herd that is apparently clean. Would you infer in such a case that for purposes of infection he would consider his herd exposed or not?

DR. CRAIG: I would not, unless there was some rather direct communication between the herds.

EDUCATING THE PUBLIC ON THE CONTROL AND ERADICATION OF TUBERCULOSIS.

By John F. DeVine,

Goshen, New York.

I dare say some of the audience after reading the title of my paper are wondering what a country practitioner can have to say that would justify the time to be consumed on a subject that has been worn so threadbare as this has by both scientists and pretenders during the past decade.

We hear much of the necessity of educating the public, if we are to succeed in suppressing tuberculosis or any other plague, and the writer is a little inclined to agree with those who think that this is one of the very important factors. Someone has wisely said that, "The safety of a nation depends upon the intelligence of its people." We certainly may add, "The health of a nation depends upon the intelligence of its people." We are also told that, "the essence of any law is the consent of the governed." It would seem then that in conjunction with legislation in our efforts to control tuberculosis, the question of *how* the public should be educated is of much importance.

I have heard lecturers and educators of many kinds attempt to educate the public on the subject of tuberculosis. Some of these people were objects of pity from their lack of knowledge of the first principles of physiology, bacteriology, and pathology; others, again, that were so severely technical they dismissed their audience without driving home a single principle that could be used even as a prop by those who would be willing to assist in the work.

Let us express our views and experiences on this very important phase of the question; make note of them, dissect them if you please with a hope that a safe, sane productive plan may evolve therefrom: It is my opinion that the public needs to be honestly educated regarding the true nature and characteristics of the disease so far and no further than our knowledge of today carries us. It seems to me that it is absolutely necessary, so that he may better understand the measures of suppression, the ad-

vantages and reasons of tuberculin and its limitations, that the layman should get this knowledge orderly arranged in his mind, coupled with information relative to the modes of infection and the port-holes of contagion. This knowledge they must have if they would become permanent supporters of our faith, for without it their minds are in an oscillating condition, ready to be swayed by the gossip about the cracker box of the corner store on the one hand or on the other by the exaggerated reports of the wonder minds gathered at the milk station in the morning, there spending valuable (?) time getting such fiction out of their system as they may have recently extracted from some farm or stock papers, the author of which is either too malicious or ignorant to write an honest and instructive article.

Those of us engaged in work that brings us in touch with this subject should take advantage of every opportunity to make known in a plain way to dairymen and breeders, that tuberculosis is due to a specific organism; that this germ and this alone causes the disease; that if we get rid of the organism we can in turn control the disease, and that fresh air, sunlight and disinfectants are the factors to be taken into account in the destruction of this organism. That tuberculosis is also a communicable disease but differs from many of the other ordinary specific and communicable disorders in being slow and insiduous, oftentimes developing in a manner as to make an early diagnosis impossible, at least, without the aid of laboratory agents. Again, we should also emphasize to them the indefinite period of incubation and making a comparison of some diseases with which they are fairly familiar as scarlet fever, measles, diphtheria, pointing out the fact that should a certain time elapse after the exposure to one or another of the diseases mentioned they could feel reasonably assured that they had escaped contamination with the disease; but this is not so with tuberculosis. We should make it plain that in poorly lighted, and badly ventilated stables, where the germs of tuberculosis are present in great quantities, there is greater danger of infection than in a building where conditions are good and the germs fewer in number or probably less virulent owing to their exposure to sunlight and air; also, it is important to have the layman understand that most specific diseases run a definite course; that if the affected one recovers, the disease leaving no sequel, the tendency is for the individual to regain normal health and be as well as prior to the illness, some diseases even leaving

a limited or permanent immunity. This is not so with tuberculosis; once infection is established, illness is not caused by toxins which the germs secrete as for example they do in diphtheria but being parasitic in nature they live upon the tissues of the host, which they eventually destroy if their progress is not arrested.

The layman should likewise understand that tuberculosis differs again from other communicable diseases in that its arrestment or so called cure is very uncertain and insecure. The bacteria of tuberculosis may remain in a dormant or semi-dormant condition for an indefinite period or the diseased parts may become healed (as is termed) which consists in the diseased area becoming encapsulated by deposits of lime salts or bands of fibrous tissues. This arrestment denotes resistance of the tissues over disease and that so long as this resistance obtains the disease will not make further progress; but should the system become weakened in any way and these barriers become broken down, the disease may begin anew and make rapid progress, often causing death by what is termed "quick consumption."

When stockmen are in possession of the above knowledge it will then be easy to make them understand the dangers of exposure to infection through feeding infected milk to young calves, or allowing them to mingle with animals not known to be free from tuberculosis. In this manner will they better understand why a certain percentage of the young animals that were supposed to be healthy, react when the tuberculin test is applied at the age of ten months or a year; likewise they will understand why some of those which are infected may not react upon the first test which is so often the case in young animals which become infected during the milk feeding period and later temporarily healed when turned into the open pasture and fed upon healthy fodder, then they will be better able to understand the limitations of tuberculin and when you advise them that tuberculin does not act upon the organism but rather upon the tubercular tissues and therefore we should not expect a reaction during the incubative stage. Likewise, they will understand why tuberculin does not give a reaction on the so-called healed cases. When we have explained the above and the possibility of a non-reacting animal being affected with generalized tuberculosis because the small amount of tuberculin injected will cause no systemic disturbance, then their minds are in a condition to see why a properly trained

veterinarian only is capable of making a proper and reliable tuberculin test.

The methods of detecting tuberculosis in the living animal is at present receiving much attention and fortunately, because the more accurate and expert our knowledge on this subject, the more we can make our profession efficient in suppressing this disease. The opinion seems to be gaining ground particularly on foreign shores and among a few in this country, that, a veterinarian skilled in physical diagnosis can by frequent physical examinations, detect a certain percentage of tuberculosis animals and practically all of those, that are distributing the virus. The experience of some of us makes it difficult to accept such doctrine. The extreme susceptibility of bovine animals to tuberculosis and the uncertainty as to when an infected animal may give off virus, either through the milk or any of the channels of elimination from the body, would seem to make it an impossibility to free an infected herd from tuberculosis, or to raise healthy calves on the unheated milk of such a herd. We have been told by some veterinarians whose ability and integrity cannot possibly be questioned, that they have eliminated tuberculosis from herds without the aid of tuberculin. Personally the writer feels that unless they have posted every animal of such a herd or submitted them to a carefully repeated tuberculin test, they cannot be certain that tuberculosis has been eliminated. Let this be as it may, it is further our duty to advise the public of the merits of tuberculin in detecting tuberculosis until, at least, it is displaced by something more satisfactory.

It is the writers' judgment that we are justified in stating that tuberculin properly prepared and wisely applied by a trained veterinarian is one of the most accurate diagnostic agents known to man. When tuberculin is used under the above conditions and indicates that tuberculosis is present, it is there every time. Tuberculin errs in some cases as in the incubative, the healed or generalized stages.

Probably no production discovered by man has ever come into more misuse and abuse than tuberculin unless, possibly, it be whiskey. A reliable tuberculin test cannot be carried out by laymen, students or incompetent veterinarians. This custom coupled with improperly prepared serum; dishonest veterinarians and stockmen, together with errors following its use, because the tissues have acquired a tolerance through previous inoculation,

purposely or otherwise, are the things that have put tuberculin into disrepute. I have seen cases where every honest effort was being made to free herds from tuberculosis, the test supervised by an able man who, spending his time in office or laboratory had detailed an incompetent assistant to inject the tuberculin and take the temperatures. Now gentlemen we cannot get free from tuberculosis this way, tuberculin testing does not consist in the mechanical procedure of injecting tuberculin and taking temperatures but to do it properly and reliably it requires a certain amount of skill to make certain that the tuberculin is injected under the skin and not squirted down the animal's side or leg. It requires a man who can tell with reasonable certainty whether the rise in temperature is a reaction to tuberculin or from some other cause which should be determined then and there and not in an office or laboratory at a later time and where valuable information may be wanting; likewise the examiner should be so trained as to be able to detect such animals as are positively tubercular and give but little or possibly no rise in temperature, he should go into the herd and stay there, so that no details miss his trained eye. He should ascertain with reasonable certainty that the cattle have had no tuberculin within sixty days and if in doubt he should fortify himself by using either the ophthalmic or the intradermal test in conjunction with a subcutaneous test or, if unable to secure the proper tuberculin for the former he should resort to increase doses of the latter and begin taking post-injection temperatures four or five hours after injecting, and carry them along to the twenty-fourth or twenty-eighth hour.

Some will argue that we cannot afford to do this, that we would not receive sufficient compensation for our time. To those the writer would say not to do it then, explain to your clients the reason for precaution and that it is for their interest. If you find that they are looking for a fake test tell them that they are looking for a crook and not a veterinarian; then you go home and get a good night's sleep and be ready for a big day on the morrow.

There is herewith appended a portion of the recommendation, presented to the American Veterinary Medical Association in 1910, by the International Commission on the Study of Methods for Control of Bovine Tuberculosis:

"The Commission after stating the known facts regarding the nature of tuberculosis and enumerating the principles to be ob-

served in its prevention and eradication, recommends the following plan of proceedure: It is recognized that in several points there are opportunities, in order to meet individual needs, to change or modify the directions herein given. It is understood, however, that whenever such modifications are made they should conform in the greatest detail to the principles laid down in the report of this Commission. The plan has for its purpose the conservation of the herd whenever that is possible."

"The control of bovine tuberculosis involes a definite proceedure under two distinct and different conditions, namely: (1) Where a herd of cattle is free from tuberculosis and it is to be kept so, and (2) where one or more animals in the herd are infected and the purpose is to eradicate the disease and establish a sound herd."

PROCEEDURE UNDER CONDITION ONE.

"The prevention of tubercular infection in cattle, free from tuberculosis, consists simply in keeping tubercular cattle or other animals away from the sound ones; in keeping tubercular animals out of pastures, sheds or stables where the sound ones may be kept. Healthy cattle should not be exposed to possible infection at public sales or exhibitions. Raw milk or milk by-products from tubercular cows should not be fed to calves, pigs or other animals. Cars that have not been thoroughly disinfected should not be used for the transportation of sound cattle. Cattle that are purchased to go into sound herds should be brought from healthy or sound herds only."

PROCEEDURE UNDER CONDITION TWO.

"The eradication of tuberculosis from infected herds requires for conservation of the herd different proceedures according to the extent of the infection. For a guide to the control of the disease, tubercular herds may be divided into three groups, namely:

"I. Where fifty per cent or more of the animals are infected.

"II. Where a small percentage (fifteen per cent or less) of the animals are affected.

"III. Where a larger number (fifteen to fifty per cent) of the animals are diseased.

In eliminating tuberculosis from infected herds the following preceedure is recommended:"

GROUP I.

"Herds where tuberculin tests show fifty per cent or more of the animals to be infected should be treated as entirely tubercular. The proceedure here is as follows:

"1. Eliminate by slaughter all animals giving evidence of the disease on physical examination.

"2. Build up an entirely new herd from the offspring. The calves should be separated from their dams immediately after birth and raised on pasteurized milk or on that of healthy nurse cows. This new herd must be kept separate from any reacting animals.

"3. The young animals should be tested with tuberculin at about six months old, and when reacters are found at the first or any subsequent test—the others should be retested not more than six months later. When there are no more reactors at the six months' test annual tests should thereafter be made. All reacting animals should at once be separated from the new herd and the stables which they have occupied thoroughly disinfected.

"4. When the newly developed sound herd has become of sufficient size the tubercular herd may be eliminated by slaughter for beef under inspection."

GROUP TWO.

"1. The reacting animals should be separated from the non-reacting ones and kept constantly apart from them at pasture, in yard and stable.

"(a) *Pasture.* The reactors should be kept in a separate pasture which should be some distance from the other or so fenced that it will be impossible for the infected and non-infected animals to get their heads together.

"(b) *Water.* When possible to provide, reacting cattle should not be watered at running streams which afterwards flow directly through fields occupied by sound cattle. The water from drinking trough used by infected animals should not be allowed to flow into stables, fields or yards occupied by sound animals.

"(c) *Stable.* Reacting cattle should be kept in barns or stable entirely separate from the ones occupied by the sound animals.

"2. Calves of the reacting cows should be removed from their dams immediately after birth. Milk fed these calves must be from healthy cows, otherwise, it must be properly pasteurized. These calves should not come in contact in any way with the reacting animals.

"3. The non-reacting animals should be tested with tuberculin in six months, and when reactors are found at the first six months, or any subsequent test, the others should be retested not more than six months later. When there are no more reactors at the six months' test annual tests should thereafter be made. All reacting animals should at once be separted from the new herd and the stables which they have occupied thoroughly disinfected.

"4. The milk of the reacting animals may be pasteurized and used.

"5. Any reacting animal which develops clinical symptoms of tuberculosis should be promptly slaughtered.

"6. An animal that has once reacted to tuberculin should under no circumstances be placed in the sound heard.

"7. As soon as the sound herd has become well established, infected animals should be slaughtered, under proper inspection."

GROUP III.

"Herds that come within this group should be dealt with either as in Group II, where the herd is separated, or as in Group I, where all of the animals are considered as suspicious and an entirely new herd developed from the offspring."

GENERAL PRECAUTIONS.

"In ALL cases animals that show clinical evidence of the disease should be promptly eliminated. They should be destroyed if the disease is evidently far advanced, if not they may be slaughtered for food under proper inspection.

"All milk from tuberculous cows that is used for food purposes should be thoroughly pasteurized. This means that it must be heated sufficiently to kill or to render harmless, any tubercle bacilli that may be present in it. For this it is necessary to heat the milk for twenty minutes at one hundred and forty-nine degrees Fahrenheit or for five minutes at one hundred and seventy-six degrees Fahrenheit. It is important that pails or other uten-

sils used in carrying the unpasteurized milk should not be used, unless previously sterilized, for storing the milk after it is pasteurized.

"When diseased animals are found, the stables from which they are taken should be thoroughly cleansed and disinfected. To accomplish this, all litter should be removed; floors, walls and ceilings carefully scrubbed with soap and water. Thorough cleaning before the application of the disinfectant, cannot be too strongly emphasized. After cleansing the disinfectant should be applied. A five per cent (5%) solution of carbolic acid, a 1-1,000 solution of corrosive sublimate or a four per cent (4%) solution of sulphuric acid may be used.

"When the stable can be tightly closed, formaldehyde gas properly used is reliable and satisfactory.

"If tuberculous cattle have been kept in a small yard the litter should be removed, the surface plowed and the fencing and other fixtures thoroughly cleansed and disinfected."

When our stockmen are in the possession of the knowledge we have just enumerated they are then quite able to understand the suggestion and advantages of these rules and taken together they should assist materially those who are honestly interested in weeding and breeding tuberculosis out of their herds.

DISCUSSION.

Dr. Marshall: I wish to endorse some of the points brought out by the essayist, especially in reference to education. Veterinarians as a rule do not take enough interest in the dissemination of knoweldge in regard to tuberculosis. In some cases, well qualified veterinarians do not care to make themselves conspicuous by going before the public with their ideas and opinions. They should attend farmer's institutes and assist in instructing dairymen in regard to tuberculosis.

The pamphlets containing the recommendations of the International Tuberculosis Commission were distributed in Pennyslvania and a great deal of good has resulted from the valuable information contained in their report. Dealers should be educated, especially in regard to buying cattle in those states where the laws are not good. I believe that any state is justified in refusing to accept dairy or breeding cattle that come from Illinois unless they have been tested by a federal inspector or a local inspector personally vouched for by Dr. Wright, the state veterinarian. As long as other states will countenance the lax laws in Illinois and allow their cattle to come into other states, the farmers will expose their herds to tuberculosis and objectionable laws will continue in force in that state.

Probably there is no more prolific cause of tuberculosis infection in calves and swine than infected milk which is returned from the creameries. The different states should pass laws requiring pasteurization of all refuse returned to farmers from creameries and butter factories.

In reference to diagnosing tuberculosis, we have unlimited faith in a tuberculin test when honestly and intelligently applied. Under certain conditions the ocular test has given good results. Animals that show well marked symptoms of tuberculosis can be appraised and destroyed without a tuberculin test. Veterinarians are required to report such cases to our board. In order that the owner can receive indemnity for physically condemned cattle, he is required to sign an agreement that he will have the balance of his herd tested and will follow the requirements of the board in reference to controlling tuberculosis in his herd. If he fails to keep his part of the contract the state can recover the amount paid him. It would be a hopeless task to undertake to eliminate tuberculosis from a herd by physical diagnosis alone.

Dr. Thomas E. Smith: Living in a city of nearly three hundred thousand people, I suppose the bovine population in that locality is less than that usually found in localities of its size, but I am none the less interested in the transmissibility of the disease, and as this is an educational paper a word along these lines from a city man may be permissible at this time. What have the veterinarians of cities been doing while our veterinarians in the country and agricultural districts have been exerting every possible effort to eradicate tuberculosis with an idea of saving their clients monetary loss and stopping the spread of the disease? Absolutely nothing. They have come to these gatherings and when the subject of tuberculosis has come up have gone to other sections because they were not interested.

Now it occurs to me we city representatives of this profession can do much to help the man who is far distant from us; we can do this by educating the people and informing them as to what our population in the rural districts are doing. Dr. Marshall referred to men giving lectures on the platform and said that most of us were too modest. That is true. I know a number of men as well qualified to talk on this subject as any lecturer, but it is hard to persuade them to go on the platform. It is remarkable the ignorance that exists in all big cities on this subject. In Jersey City they know absolutely nothing of what we are doing. When a physician doing a general practice thinks certified milk is a patent baby food you have an illustration. If we can organize some sort of a lecture bureau and appear before the different municipal bodies and skeptics and tell them what the veterinarian is doing in an endeavor to suppress tuberculosis it would be a good plan, for if the people of the city become interested in this they can be of great benefit to us and will cooperate instead of oppose the rural representative in legislative matters relative to this disease.

I am talking from the standpoint of a man from the city suggesting how best to bring about a condition that will eradicate this disease and think we can help considerably if we do not hide our light under a bushel, but go out on the highways and byways, each one of us con-

stituting himself a committee of one to attack poor meat or poor milk, or the condition that exists owing to the bad and improper tuberculin testing.

Dr. Ellis: As Dr. Smith has exposed the ignorance in Jersey City in keeping with its population, I am wondering what it is in New York City, where the population is so much greater? I am very much interested in Dr. DeVine's paper and in the remarks of Dr. Marshall and having been interested for some little time in the sentiments expressed by Dr. Smith, want to endorse what he says. I presented a paper before the United States live stock sanitary association last winter, and among other things recommended the education of cattle owners through allowing them every opportunity possible, to witness post-mortem examinations following condemnation based upon tuberculin tests. Dr. Marshall and others have impressed upon me that it is almost impossible for veterinarians to detect the disease by physical examination.

I can only add to Dr. Smith's remarks relative to the educational work that may be carried on by city veterinarians in regard to the transmissibility of tuberculosis from animals to man through milk and other animal food products, that, while veterinarians of the rural districts are attending farmers' institutes and state granges, talking about how to control the disease in cattle, we in the cities should never fail to explain to the people its transmissibility through the careless handling of milk in their homes. Along this line, at a state meeting last month, Dr. Smith expressed the idea he has voiced here, as to lecture bureaus in every veterinary organization in the country.

I hope Dr. Smith has taken this opportunity to present to the Committee on Resolutions of this body, measures recommending that this Association have a lecture bureau. I hope the president of every state organization will feel as he does, and that some member of the organization will see that such a bureau is established. When we convene in October in New York City I am going to endeavor to have such a bureau incorporated in our city organization.

Dr. V. A. Moore: I would like to emphasize the point referred to by Dr. Marshall. It was also brought out somewhat yesterday in the discussion on glanders. The remarks I wish to make apply to glanders and to mallein quite as much as to tuberculosis and tuberculin, and that is the lack of faith on the part of a great many veterinarians to stand by the tuberculin test when they cannot satisfactorily demonstrate to the owner the presence of tuberculosis in the animals. When a veterinarian tests a herd, for example, and gets a good, unquestionable reaction, in a number of animals and those animals come to the post-mortem inspection where ninety per cent of them exhibit unquestionable lesions of tuberculosis, but in the other ten per cent, because he cannot see in them the tubercular lesions, why should he be willing to accept the statement of somebody that the animals have not tuberculosis and that the tuberculin is a fake. We must not say that tuberculin has failed because we do not find the lesions, no matter how thorough our microscopic examination may be. If we study the tissues in the labora-

tory we will find tubercles perhaps so small we cannot see the lesions with the naked eye. Where we get the reaction I do not see why we should admit the animal has not the disease simply because we cannot find the lesions. You cannot see the oak tree until it gets above the ground. You cannot see the tubercle lesion until it arrives at a size the eye can distinguish.

Dr. DeVine: I simply want to second what Dr. Moore has said relative to tuberculin. If the tuberculin test has been carefully and conscientiously applied and you get a reaction I believe, as he does, that if an extensive search is made there is not a case that will not show tuberculosis somewhere.

BOB VEAL AND THE CONSERVATION OF THE MEAT SUPPLY.

By Pierre A. Fish,

Ithaca, N. Y.

Why should the tissues of a four or five week old calf be fit for food and those of a two or three week old calf unfit? The only answer at present is that the laws say so. But the laws are not wholly consistent. Although calves four or five weeks of age are legally fit for food in the great majority of the states of the union, they are still unfit for consumption within the state borders of Arkansas and Missouri where a minimum age limit of six weeks is required. The federal law, which formerly required an age limit of four weeks, was changed in 1906 to a minimum age limit of three weeks. The state of Pennsylvania is said to require a similar age limit. Do the inhabitants of Arkansas and Missouri possess better health and greater physical vigor than the other inhabitants of this nation because the veal they consume is more mature? Is the general population of this country any healthier or happier than the residents of Pennsylvania where calves only three weeks of age, half the age of those in Arkansas and Missouri, may legally be consumed for food?

In the majority of the states, where laws pertaining to this subject exist, the favorite age limit for bob veal is four weeks. Is there any particular reason why the majority should favor this age limit? It there any marked difference in the character of the tissues just before and just after the age limit which determines just when the bob features disappear? If so, why does the change appear one week earlier in the Pennsylvania calves and two weeks later in the Arkansas and Missouri calves? The laws have undoubtedly been imposed arbitrarily according to the judgment of legislators whose ideas of the maturity of the tissues have perhaps depended upon the physical appearance of the meat. Otherwise it would be difficult to account for the three weeks variation as regards age limit.

The object of the law is undoubtedly the worthy one of safeguarding the public health. Has it been shown as yet that the consumption of bob veal undermines the health? Exact data seems to be lacking and it is largely because of the absence of such data that the present investigation was undertaken. Another important reason for the investigation is to determine, if possible, just what bob veal is and in what important respects it differs from what is termed mature veal. Thus far, apparently, inference and prejudice have been the determining factors in imposing the law as regards age limit. If there is a scientific basis for the differentiation of the tissues the law should be based on that or at least upon something more substantial than inference. The usual methods of identifying bob veal are not infallible. The condition of the navel; the distance the teeth have protruded from the gums; and the amount and character of the fat about the kidneys are merely clues and are applicable for only a short period after birth. They can be of little value when the calf is near the three or four week age limit, unless the calf was born prematurely and was backward in development. Even then if the calf has reached the age limit, the law permits its sale for food although its tissues still lack much in the way of development as compared with the normal calf of that age.

The writer has not been able to find anything in the way of literature upon bob veal, but has personal information that some twelve or fifteen years ago Professors Gage and Moore of Cornell University investigated the matter from the histologic side, in an effort to determine some difference in the blood, muscle fibers and structures of other organs of bob veal and older veal. No conclusive differences were found. Shortly afterward the writer attempted to differentiate the tissues of the younger and older veal by seeking to determine if a larger amount of glycogen were present in the muscle fibers of the young veal. The results were not promising and the work was abandoned. Two years ago the work was resumed. It is a well known fact that the tissues of young animals contain a somewhat greater amount of water than do those of the older ones. It was upon this basis that the present work has been done. Three lines of experiments have been carried on: (1) The determination of the freezing point of the meat juices expressed from the tissues. The fewer the solids present the nearer will the freezing point come to that of distilled water which contains no solids. (2) The determination

of the specific gravity of the meat juice by means of the pyknometer. (3) The determination of the percentage of water present in a piece of meat of given weight; the weighing being repeated at intervals until a constant weight was obtained.

Of these methods the first or freezing-point method was believed to be more sensitive and reliable than the others and has therefore been more frequently used. For the experiments portions were taken from the loin and round as it was believed that these portions were representative of the parts more commonly used for consumption. The calf was killed by pithing and bleeding. The carcass was hung up, skinned and allowed to remain until the next day, when the tissues needed for the experiments were removed. Thus far sixteen calves have been used ranging from one to fourteen days of age. The freezing point of each sample was taken twice and the average of the two used in compiling the statistics. From twenty to twenty-two samples each of veal and beef, purchased in the market, were used for control and for comparison. About two hundred and twenty-four determinations of the freezing point were made upon this material, The most of the material was also subjected to the specific gravity and percentage of water methods. A summary of the results is shown in the following table:

Methods.	Bob Veal.		Market Veal.		Beef.	
	Loin.	Round.	Loin.	Round.	Loin.	Round.
Freezing point	0.9439°	0.9600°	1.0625°	1.0822°	1.06195°	1.080°
Specific gravity	1.0263	1.0281	1.0314	1.0342	1.0315	1.0328
Percentage of water	77.08%	78.43%	75.87%	75.43%	73.66%	71.76%

The averages show that there is a greater correspondence between the market veal and beef than between the market veal and bob veal less than fourteen days of age. The freezing point of the round is depressed somewhat lower than that of the loin. Although the averages show a satisfactory line of demarcation, there are occasional individual exceptions and the method cannot be regarded as infallible. In a few cases the freezing point of the tissues of the bob veal was depressed as low as that of market veal and in a few other instances the freezing point of the tissues of the market veal was depressed no lower than that of

bob veal. In a few cases the freezing point of the beef loin was depressed no lower than that for bob veal. In the round the freezing point was generally lower than that for the loin, but here also occasional exceptions occurred. Another exception must be made in the case of the bob veal up to five days of age. Here curiously enough it was found that the freezing point of the round was not depressed so far as that of the loin, but after the fifth day the reverse occurred.

The results show that there is a somewhat larger percentage of water present in the young veal. Aside from this and a deficiency in the amount of fat present, there appears to be no marked difference between the younger and older veal. For food purposes fat may be supplied artificially and the question then depends principally upon the amount of water present. Is water harmful? All food contains a considerable percentage of it. Our own work shows there is only two or three per cent more water present in the young bob veal than in the mature veal, and our results agree very closely with those of other investigators for the calf and beef. For the bob veal we have been able to obtain no other data than our own. Should the use of bob veal as a food be prohibited because it contains a slightly larger amount of water than the mature veal? This would seem illogical when such articles as crabs with 79.97% of water, oysters with 80.5% of water, lobsters with 81.84% of water, perch with 82.6% of water and the flounder with 84% of water in their tissues are considered not only harmless and palatable but are regarded as nutritious and as delicacies and bring good prices in the market. If bob veal were cooked and served at the table, how many could distinguish it from mature veal? Doubtless many have unknowingly eaten bob veal without injury to themselves, who would have disdained to touch it had they known what it was; for bob calves have been and even now, perhaps, are sometimes substituted for veal calves.

Would bob veal be eaten if there were no laws prohibiting its sale as a food? There is in this country a considerable foreign population which has been accustomed to eating veal of this character in the old country. These individuals knew what they were eating and wanted it. They doubtless would still continue to use it if they could procure it. From the standpoint of health and vigor, it must be admitted that they compare favorably with the native population. Others financially poor, who use meat in-

frequently or not at all because of its high price, might be expected to use it if reassured as to its harmlessness and its food value. Such veal could be marketed more cheaply and therefore sold for less to the consumer.

In foreign countries the laws relating to bob veal are variable. In England it is said that the calf for the market must not be slaughtered less than two weeks of age, but that the usual age for food purposes is five weeks. In Germany the marketable age of the veal varies with the locality. In the greater number of districts the minimum age limit is placed at from eight to fourteen days, in others four weeks, and still others only a few days. The continued use, in certain foreign countries, of what is regarded here as bob veal, is evidence that serious injury to the health does not occur.

The only way to test the harmfulness or usefulness of bob veal as a food is to eat it. This phase of the question was also included in our experimental work. Seven families, including over twenty individuals, cooperated. The individuals ranged in years from a child of two years to an old lady of over sixty, thus giving a wide range and a fair test as to physical conditions. All of the families knew the character of the meat they were getting. No special conditions surrounded the experiments; the veal was served with the ordinary meals as if it might have been obtained at the markets. A few partook of a portion of each carcass, but as there was not enough to supply all, the remainder took their turns. In no case were any unfavorable reports received. There was no indication of a disturbance of the normal physiologic functions, nor physical deterioration so far as could be ascertained. The veal was wholesome, satisfying, palatable if cooked with pork or other fat to supply the natural deficiency, and apparently as nutritious as older veal. Each family was always ready to receive another supply when a carcass became available.

Thus far the work has been confined to the extreme bob conditions as regards age and immaturity. The specimens used have been from the time of birth, one day, up to fourteen days of age. This should be as fair a test as could be desired for dietetic experiments. It is planned to continue the work from this point up to the legal age of four weeks as indicated by the majority of states having such laws. With the bob veal approaching the legal age limit, it is not unlikely that there will be less divergence as to the freezing point and maturity of the tissues. A sharp line of

demarcation is not likely as the processes or growth are gradual and one condition blends into another imperceptibly.

A just law must consider the producer as well as the consumer. In those sections where intensive dairying is carried on, if the calf is of the wrong sex for milk production, or if for any reason it is not desired to rear the calf with the herd, it is economy for the owner to dispose of it early. If it does not pay to raise the animal to the legal age for veal, the owner may kill it and sell the hide for one dollar or less. The carcass may be cooked and fed to the swine and poultry or it may be buried. The disposal of young calves in this manner throughout the country at large is undoubtedly considerable, since there is no market for them and the waste is correspondingly great. The farmer naturally assumes that the flesh is unwholesome since the law prohibits its sale. If he were aware of its harmlessness and had no antipathy to eating young flesh and consumed it in his own family, much of this waste could be avoided.

The situation that confronts us at present is an increasing human population; an increasing cost for the necessities of life and a diminishing meat supply the major portion of which consists of beef and veal. According to the census for 1910, the human population of the continental United States was 91,972,267. The population of the cattle in the United States on farms at that time according to the same authority was 61,803,866. Compared with the census of 1900, it was shown that there had been a total gain in the human population of twenty-one per cent, or that the rate of growth had been on the average two and one tenth per cent per year. Assuming that the same ratio of growth is going on, the present population of this country should be about 95,835,102. In 1900, according to the census, there were 67,719,410 cattle upon the farms in the United States, or 5,915,544 more than there were in 1910, showing a loss in the latter of eight and seven tenths per cent. In other words, while the human population had gained twenty-one per cent during the ten years, there had been a loss of eight and seven-tenths per cent in the cattle population during the same period. The population of the cattle in the United States up to January 1, 1912, according to the bureau of statistics of the United States department of agriculture is 57,959,000. In comparing the figures for 1910 and 1912 it would appear that the estimated gain in the human population is 3,862.-835 or four and two-tenths per cent, while the number of cattle

has decreased 3,884,866 or a loss of a little over six and two-tenths per cent. If the cattle had increased during the two years in the same proportion as the human population, there should be 6,440,628 more cattle than now exist. The average yearly decrease in cattle for the ten years from 1900 to 1910, according to the figures of the census was something over a half million per year. If the figures of the United States department of agriculture are correct, there is shown to be an annual decrease for the two years from 1910 to 1912 of nearly two million cattle—an average annual decrease between three and four times as great as existed during the previous decade. These figures show the necessity for devoting some attention to the conservation of the meat supply if meat is to continue as one of the staple articles of diet in this country. According to the bureau of statistics, the per capita consumption of dressed meat in the United States is 185.8 pounds and, in their list, the United States is exceeded by only two other countries—the Australian commonwealth and New Zealand. Statistics also show that the farm value and number of farm animals have not increased and decreased in the same ratio; a diminution in the number has not always been followed by an increase of value, but often by a decided decrease and yet the cost of the meat to the consumer has been just as high or even higher.

In conserving the meat supply it is obviously desired to encourage further production of the meat animals, but aside from that much may be done in considering the matter of veal. It is obviously inconsistent that calves legally fit for food in the various states are unfit in Arkansas and Missouri; that calves three weeks of age are legally good food in Pennsylvania with the sanction of the federal government, but nowhere else where the laws prevail. One of the first and simplest steps in the process of conservation would be the adoption of laws by the various states conforming to that of the federal government. Such laws would bring about uniformity; also less confusion in interstate commerce. The reduction of the age limit to three weeks would be no injustice to the consumer, since it has not been demonstrated that veal of that age is injurious and the test has already been made in Pennsylvania and foreign countries. Such a law, furthermore, would show greater justice to a large number of producers by enabling them to market those calves within a reasonable time which they did not care to raise. A further reduction to two weeks or even one week may,

in the course of time, be found desirable. These age limits prevail in many parts of Germany and have for some time. If the food were unwholesome or injurious, it is unlikely that the practice would continue. Finally the sale of bob veal as such may be legalized if properly labeled. As has already been pointed out, there is a certain demand for it and because it could be sold for lower prices the demand for it would undoubtedly grow. One of the chief reasons for our investigation was to test its effect as a food. If persons in the tender age of childhood and those well along in years felt no injurious effects from its use at occasional intervals over a period of two years, we may reasonably feel justified as to its harmlessness, if proper and similar sanitary precautions be taken with it as with other meats.

It is our opinion, therefore, that a considerable step in the conservation of the meat supply of this country will have been taken, if uniform laws might be established, in harmony with that of the federal government, reducing the marketable age of veal calves to three weeks; if the sale of bob veal properly labeled as such might be legalized, so that those who may desire can purchase it; and finally that the considerable waste on the many farms in this country may be checked, by extending the information to the farmers that the flesh of bob calves is not only harmless, but wholesome and, in the absence of a legal market, may properly be used upon their own tables for food.

DISCUSSION.

Dr. Mohler: The paper which has just been presented by Dr. Fish is certainly a very important one and deserves the closest attention. There seems to me to be two sides to the question of the consumption of bob veal; one is the esthetic side and the other the hygienic side. I will not discuss the hygienic side because my assistant, Dr. Berg, is conducting an independent investigation along this line, and I do not care to anticipate his results. From the esthetic viewpoint, I sincerely doubt whether the American public is ready and willing to purchase bob veal as such. There is one serious objection to labeling such meat "bob veal," as Dr. Fish suggested in his conclusion, and that is the wide range of meaning this term may have, as for instance a two days old calf and a twenty days old calf would both be "bob veal." Sworn evidence has been presented to show that not only the carcasses of calves two or three days old have been illegally put on the market by unscrupulous dealers, but slunk calves as well and it is quite impossible after the latter have been appropriately dressed to detect this fact, not knowing the history. Therefore, I think it necessary in labeling such

meat to go farther than merely to call it bob veal; for if bob veal is to be marketed the age of the calf should appear in addition. The three-week age limit has been referred to as an arbitrary ruling but it has this advantage: it is much easier for an inspector to tell the age of a calf under three weeks old than it is between three and five weeks for instance. Now I would be willing to consume veal say a day younger than three weeks, but I would not knowingly eat veal of the age mentioned in the paper. A line must be drawn somewhere and when we reduced the age limit six years ago from four weeks to three weeks considerable adverse criticism was evoked.

The American consumer, as we know, is a fastidious consumer. As an illustration, it is well known that the people of Boston demand eggs of a brown color, while the New York people prefer white eggs. I have a friend in California who owns a large herd of Angora goats. He is also the proprietor of a newspaper, and several years ago became very anxious to have his kid meat sold on the market as kid meat. This meat was being sold right along by the local butcher as lamb and the unsuspecting buyers bought it and relished it under the impression that it was lamb. The breeder made arrangements with the butcher who was handling the kid meat to advertise it in his newspaper without charge, and he did so, but it was only three weeks before the the butcher was obliged to go out of business. Nobody wanted to eat kid meat as such, although for three years his customers had been consuming it with a great deal of satisfaction when it was sold as lamb or mutton.

Not more than a year ago a bob veal case was brought up in the courts of the District of Columbia when the inspector of the health office prosecuted a butcher for the sale of bob veal. He presented his case, described what the literature of the day gives on the subject, and mentioned the symptoms of people made ill by consuming such meat. But the case went against the inspector as the judge decided in favor of the butcher. Several days later the judge ate some veal for his evening meal and attributed an illness which followed to its consumption. Sometime after recovering he met the district inspector on the street and told him if he brought any more cases such as the recent one he would be glad to reconsider his decision, because he had experienced the same symptoms after consuming immature veal as the inspector had described on the stand.

I agree with Dr. Fish with reference to the lack of uniformity, not only between the laws of the various states, but between the laws of different municipalities. The absurdity of certain cities and states having a six weeks limit, others four weeks and still others three weeks, is apparent. By eliminating calves under three weeks of age from the market we eliminate a great many that are affected with various diseases and thereby decrease the danger to the consumer of meat. The experiments of Winzer show conclusively that the bacteria which produce meat poisoning in man are more prevalent in young calves than in older calves, the number gradually decreasing with the increase in age. If we keep the limit at three weeks we will get rid of a great

many of the diseases which we would not eliminate if the age limit is lowered.

Dr. Gill: The amount of fat in bob veal determines the quality rather than the age, and I have yet to hear from anyone who should know, that uncontaminated bob veal of good quality, is generally unwholesome or unfit for human consumption. My experience has been that bob veal decomposes sooner than matured meat and it is my opinion that from the time of slaughtering, it should be shipped and kept at a temperature no higher than fifty-five degrees Fahrenheit until it reaches the consumer.

The laws regulating the sale of veal should be made uniform. At the present time the laws of the state of New York demand that no calf meat shall be sold unless it was at least four weeks of age when killed, while the federal law is three weeks. The law is positive and does not give discretion to inspectors as to the quality of the veal except when diseased or foul. Except for the conservation of the milch cow, this bob veal question is one of meat inspection only.

Dr. Mohler: With reference to Dr. Gill's remarks, I certainly think it would be improper to attempt to determine the age of a calf by the appearance and condition of the fat. The most accurate way of ascertaining the age of a calf is by the umbilical cord. The stump dries in the first four to six days and drops off within two weeks, leaving a moist surface which soon scabs over and this scab generally falls off inside of the fourth week. Any inflammatory process which interferes with this normal procedure is readily apparent and must be given due consideration. Of course it is impossible to tell within a few days of the age but if the calf has an umbilicus hanging to it you can be pretty sure that the animal is under three weeks of age. Various works on meat inspection speak of the appearance and eruption of the teeth, the formation of the horns, the condition of the arched pad on the hoofs and the ossification of the bones in establishing the age of calves, but when it comes to a practical test the umbilical cord and the scab which follows will be found to give the most accurate results.

Dr. Moore: I would like to refer a little more in detail to a matter mentioned by Dr. Fish, that of work done by Professor Gage and myself some years ago. We have a law in New York requiring an age of four weeks. In order to render service to the department and also ascertain from the biologic side whether we could determine the age we made a very careful histologic study and microscopic examination of the blood and all the tissues. We also made an examination of calves that were killed at different ages. Through the cooperation of the department in Albany we secured calves from two days up to about five weeks. They were all slaughtered and we had an opportunity to make a very careful post-mortem examination of these animals. The outcome of it was that absolutely nothing that was being used as positive evidence in suits in regard to age of calves could be relied upon, absolutely nothing. In some calves two days old we found the teeth as much advanced, the ossification as much advanced, as in others that were four weeks old. The only positive evidence we found was

the umbilical cord. We found if the calves had been healthy this cord disappeared practically in fourteen days. If this cord was on and the calf was normal we decided it was under two weeks. Of course a slight infection might change that to a certain extent.

We had in the state senate at that time a man who was very emphatic against bob veal. He was chairman of the public health committee. I had occasion to be in his locality and was introduced to him by a man having charge of the veterinary work and having a good deal to do with bob veal. I asked the senator why the law was made and enforced. He went on to state that they did not want bob veal, and so on. I asked him how he was going to tell whether it was bob veal or not. He said, "You can tell by the size." I had to differ with him. Then he said, "You can tell by the teeth." I said that could not be done. He said "You can tell by the length of the hair and the hoof." I had to differ with him again. He enumerated a number of other ways and finally said, "Why, I want to tell you that any damn fool can tell bob veal!" And that is about the basis of our legislation in regard to this subject.

It is said that people sometimes become sick after eating bob veal. That is undoubtedly true in a number of cases. Some people cannot eat lobsters without becoming sick; some people cannot eat a great many other things without having them disagree with them. It is true that probably many persons cannot digest good veal. Here is the tendency. You see it in milk and in everything. If a person is sick the American public wants to find out the cause. If the individual who is sick has eaten veal, why, it is veal that caused the sickness. Maybe it was veal and maybe it was not. So I think that we have to consider the tendency of the individual, these assumptions, of which medical literature are so full, are very few of them positively established.

In regard to the enteritis organisms and diarrhea in calves. It would seem to me that the calf, which in most cases is born healthy, if killed at the age of three days, before it gets sick, is infinitely safer from that point of view than the calf that is three weeks old and has had a profuse diarrhea for two weeks. I have seen calves, many of them, that have had diarrhea for two or three weeks and were then killed. They were killed at the limit of the time period and sold for food. Now if there is anything in regard to diarrhea that is going to cause the flesh of that calf to be unwholesome it ought to produce it at that time. I do not see that the three weeks limit helps that at all.

The calf that is two or three days old may contain more of these organisms. They have umbilical infection many times. This enteritis is perhaps a normal habitat of the bovine species and is fairly prevalent perhaps in the environment of cows and the calves would naturally become affected by it. If a calf is killed before these organisms have a chance to multiply I fail to see why it is not as safe or safer than when killed at the climax or at the end of this severe diarrheal period. These are questions that are important, and I think it is a disgrace, the testimony that is given in our courts in regard to the wholesomeness or the unwholesomeness of bob veal. Many things are sworn to by

veterinarians without any facts whatever to base their judgment on. With the continual decrease of our meat supply it does seem to me, in spite of all this talk about the unwholesomeness of bob veal, that there is no reason why the law should prevent one from selling a calf two or three days old to a neighbor to eat if he wants to buy it. If I do that today I commit a misdemeanor; but I do not see any physiologic or hygienic reason why I should not do it. I think the time will come in this country, as it is in Germany, when it will be done. I hope the time will never come when it will be sold as veal. Dr. Fish does not believe in that, but he believes, and I believe, if people want this young calf flesh they should have a right to buy it.

The question of the disease of the calf, of course, must be safeguarded in some way; but it is not safeguarded in our own state, at least at the present time. We are not protected against these diarrheal conditions in the calves, and they do occur many times. I heard Dr. Williams tell the other day of calves he saw going to the market suffering severely from diarrhea.

Dr. Mohler: I would like to ask why the calf you refer to as having had diarrhea for two weeks should not be condemned by the inspector, not because it is bob veal, but because of the conditions found in the post-mortem?

Dr. Moore: For the very good reason that there is no inspection; it is left to the conscience of the butcher. We have inspection in certain places, federal inspection in interstate trade, but there is no inspection where a great many of these calves are killed.

Dr. Mohler: I am referring entirely to where inspection occurs, federal, state or municipal.

Dr. Moore: I think that condition will be met when we have proper municipal and state meat inspection. At the present time we do not have it, and under present conditions we continue to suffer as much from these diseased calves at four or three weeks old as we would if they were sold earlier. Not that it is right; I am not justifying it at all; but I am pointing out that many calves three weeks of age are killed during the course of the disease.

Dr. Mohler: If there is no inspection there is no discrimination between bob veal and the mature calf; who is to tell whether it is bob veal or a mature calf?

Dr. Moore: There is no one to say. The point I wish to make is that on that ground I do not see why you should discriminate more against the two weeks' calf than the three weeks'. My contention is that the meat is as bad, and in many cases worse, if the calf is killed at three or four weeks while suffering from the disease than if killed before it had the diarrhea. Unfortunately in New York, and I think it is true of a great many other states, we have no inspection and these calves do get to the market. I think nobody can question the fact that a great many calves are killed that are under the legal age. The doctor and myself do not differ in regard to that at all, except he is pointing out places where the meat is inspected and I am referring to places where the inspection does not exist.

Dr. Marshall: We have considerable trouble with bob veal in Pennsylvania. There are sections in our state where people do not care whether veal is one day old or six months old. This is especially true in some of the mining sections where the foreigners are willing to buy veal of any age. We have an old law in Pennsylvania which aims to prohibit selling veal under three week sold, but the fine is very low. In 1909 a law was passed, making it a misdemeanor to sell immature, unwholesome or unhealthful veal, and under this law the fine is more severe.

We have ten regularly employed meat hygiene agents in Pennsylvania, and the matter of condemning bob vail is left to their opinions. If one of them finds veal which is unfit for food he condemns it and prosecutes the offender.

The American Humane Society has a bill before congress at the present time which aims to prohibit shipping immature calves to market. It should be considered cruelty to animals to ship young calves and have them on the road from three to four days without food.

Dr. Jacobs: If a calf is four or five weeks old and is not accompanied by a considerable amount of adipose tissue that calf should not be passed for food.

Dr. Fish: From the esthetic standpoint there is no opportunity for discussion, because no law can be passed to compel people to conform to certain standards in that respect. My own work was rather along economic lines, because I feel we will soon face, if we have not already begun to face, a real crisis in the matter of the meat supply of the country. I was rather startled in looking over statistics, in preparing this paper, to find that the last United States census shows only about one-half as many calves listed as in the previous census. What Dr. Mohler said in regard to kids and lambs emphasizes the point I think I referred to in the paper, that tissues are acceptable esthetically perhaps when they are known under another name; but as to the question of quality, it would prove the point that the tissue should be just as harmless under one name as another. It is so with bob veal; there are some, probably, who would eat bob veal without any qualms at all if they did not know it was bob veal who would not eat it under any consideration if they knew just what the tissue was.

Now in regard to the instances of unpleasant results or sickness caused by the use of bob veal. May it not be difficult to *prove* that it actually does come from bob veal? In many parts of Germany what we term bob veal is offered in the market. In one instance a family went to the market, purchased some bob veal and after consuming it were taken sick. All who partook of the meat became very sick. The general tendency was to condemn the bob veal, but there was an inspectator in that district who was of a very thoroughgoing character and upon investigating the matter he found out where other cuts from the carcass had been sold, traced them and found that no others who ate of the meat were affected apart from this particular family. Apparently the trouble was that the meat had become contaminated after it had left the butcher's shop.

With regard to young animals and the diseases associated with them, the conditions there perhaps work both ways. There are some facts that may point to a condition that young calves are not so susceptible to certain diseases as others. I was told a while ago by one who was on the killing floor that it was less common to find diseased tissues in young calves than in the older ones. Now the question is as to whether the tissues of bob veal are more susceptible to pathogenic organisms than the older tissues. I am aware of the fact that such statements have been made, general statements and inferences, so far as I know. That is one of the questions I think ought to be determined by actual tests. A great many statements with regard to bob veal have been made in a general way and without scientific basis.

It may be a fact that the tissues of bob veal are more susceptible; that they form a better pabulum for organisms than older tissues, because they contain a larger percentage of water. Fluid, of course, is essential for the growth of organisms. The tissues of fish or oysters, on this ground, should be a very excellent pabulum. I might say my own reason for taking up the work is that, so far as I can find, the general statements in regard to the question are inferential. I was not able to find anything at all that I can remember that was based upon scientific facts, and I wanted to settle some of these points, if I could, one way or the other. I was more or less prejudiced against bob veal when I undertook the work; but I feel that I must be governed by my own observations and what I think are the facts in the case, as presented in the paper.

USE OF THE FERMENTATION TEST IN DAIRY INSPECTION.

By L. A. Klein and H. C. Campbell,

Philadelphia, Pennsylvania.

The different species of bacteria most commonly found in milk may be grouped according to the character of curd they produce when the milk is kept at a temperature of thirty-seven to thirty-eight degrees centigrade. Organisms that ferment the milk sugar and form lactic acid produce a solid, homogeneous, jelly-like curd, with little or no fluid. Another group of species, including the bacilli of the subtilis and mesentericus group, produce a rennet-like ferment that coagulates the casein and a proteolytic ferment that digests or peptonizes it. The different species in this group produce the two ferments in varying proportions. When the rennet-like ferment predominates the curd is hard, contracted, in one or several pieces, floating or suspended in more or less fluid, which is almost entirely clear, but may have a greenish or whitish tinge; it is slowly digested. When the proteolytic ferment is dominant then the curd is soft, flocculent and "mushy" or coagulation does not occur at all, but peptonization is rapid. These are the so-called "cheesy" or "peptonized" curds. The staphylococcus pyogenes and the bacilli of the proteus group also produce a "peptonized" curd.[1] The bacteria of the coli-areogenes group produce a jelly-like curd, permeated more or less with gas bubbles, in one or more pieces, floating or suspended in a turbid fluid, which may also exhibit collections of gas bubbles. A "flaky" or granular curd, associated with fluid that is turbid and may be whitish, yellowish or otherwise discolored is produced by a species of yeast that ferments lactose.

Species representing all of these groups will be found in any sample of milk. The time of curdling will depend upon the number of bacteria in the milk and the temperature at which it is kept, but when the milk is kept at a temperature of 37° to 38° centigrade the kind of bacteria present in greatest proportion will determine the type of the curd, except when the milk is very rich in

[1] Weigmann, H., Mykologie der Milch, pp. 58 to 66.

bacteria. Then, according to O. Jensen, the lactic acid forming organisms are so numerous that they suppress the other species and a jelly-like curd is usually formed. The character of the curd can, therefore, be taken as a criterion of the bacteriologic properties of the milk under examination, and, furthermore, as indicating the variety of fermentation or decomposition the milk will undergo with age.

Upon these principles was founded the fermentation test. This test, first proposed by Professor J. Walter, of Switzerland, and subsequently improved by A. Peter and others, has been in use for years in cheese factories to detect milk unsuitable for cheese making.

It is very simple and does not require any special apparatus. In cheese factories large test tubes or bottles holding from one hundred and twenty to one hundred and forty cubic centimeters or smaller test tubes of forty to fifty cubic centimeters capacity are used for the milk samples. They are closed with a rubber stopper and are held at the required temperature in a water bath. In our work we have used test tubes of fifty cubic centimeters capacity, closed with a cotton plug in the usual manner for bacteriologic work. This size tube is to be preferred to that usually used for bacteriologic cultures because with the greater quantity of milk that can be placed in the larger tube the test is more reliable and the result is easier determined[2]. We have also used an ordinary incubator in place of a water bath.

The test tubes are washed and cleaned in the usual manner, plugged with cotton and sterilized by heating in a hot air sterilizer for two and one-half hours at a temperature between 150 and 160° centigrade. It is quite important that the tubes are sterile, as any organism in the tube would develop in the milk and might influence the result. The tubes are numbered with a paraffine pencil to correspond with the sample of milk and are then filled to within a finger's breadth of the bottom of the cotton plug and placed in the incubator. In transferring the sample of milk from the vessel in which it was collected to the test tube. the necessary precautions should be taken to prevent contamination.

Twelve hours after being placed in the incubator the samples are examined. If the milk was fresh and normal there will be no change apparent, except, perhaps, a clean, sour odor. "When

[2]Barthel, Chr., Die Methoden zur Untersuchung von Milch und Molkereiprodukten, Zweite Auflage, page 120.

the cream layer is bulged upward, or there is a greenish layer beneath it, this is an indication of the beginning of fermentation or curdling[3]." If there is no change at this time then the samples are to be placed in the incubator and observed again in twelve hours, and subsequently at twelve hour periods, if necessary. When curdling does not occur after forty-eight hours then the reaction of the milk should be taken and preservatives tested for. If the milk is curdled then the character of the curd is to be noted. As was first pointed out by A. Peter[4], the various curds may be classified into five types or classes, with three degrees or variations for each type. He also proposed a system of symbols or abbreviations to be used in recording the results of tests. This classification and the symbols have been followed by us in the main.

The types of curd and the symbols by which they are recorded are as follows:

One. Jelly-like curd. J1—Solid, smooth, white, jelly-like curd, with no fluid. J.2—Curd same, but showing very few furrows or gas holes. J.3—Curd presents furrows, gas holes or cracks, with some fluid.

This type of curd indicates that the lactic acid forming bacteria predominate and if it is present at the twelfth hour or before indicates that the original contamination with this species was excessive or that the milk was old. According to O. Jensen, however, milk very rich in bacteria will always give this type of curd because in such milk the lactic acid formers are as a rule present in such large numbers that they repress the other species.

Two. Peptonized curd. The curd may be hard, contracted and in one or several irregular pieces, or soft, flocculent and mushy, with more or less fluid that is entirely clear, but may have a greenish or whitish tinge. P.1—The amount of fluid is small in proportion to size of curd. P.2—Increased amount of fluid P.3—Amount of fluid large in proportion to the size of the curd.

Three. Gaseous curd. A white, jelly-like curd, showing small holes due to gas formation and in the higher degree presenting a sponge-like appearance; may be torn and a portion driven to the top; more or less fluid present, which may also show collections of gas bubbles. G.1—Gas holes in the cream layer or in the curd. G.2—Gas holes numerous in the cream and curd; gas

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[3] Gerber, N., Die Praktische Milch, Prüfung, page 84.
[4] Wyssmann and Peter, Milchwirtschaft, dritte auflage, 1907.

bubbles may also be present in the fluid. G.3—Curd sponge-like, containing many gas holes; may be split and a portion driven to the top; gas bubbles in fluid.

Four. "Flakey" or flocculent curd. Curd in flakes, associated with a turbid fluid, which may be whitish, yellowish or otherwise discolored. Flc.1—Curd in fine flakes or partially homogeneous. Flc.2—Large flakes and considerable fluid. Flc.3—Large flakes, torn, with white or discolored fluid.

Comparison of the sources of the several species of bacteria usually present in milk with the groups of species producing the different types of curd showed a striking parallel between the individual sources and the several types of curds. The lactic acid forming organisms which produce the jelly-like curd are found in greatest abundance in the milk vessels and apparatus. Of the peptonizing bacteria, the species most common in milk, are those which inhabit the soil and which are brought into the stable in the dust on the dry fodder and straw and disseminated in the air of the stable when these substances are distributed. When a cow lies down upon dusty straw or upon a dusty place at pasture some of these organisms may also get into the folds and creases of the skin of the flanks and udder. The gas-forming organisms of the coli-areogenes group are normal inhabitants of the intestinal tract and are eliminated with the feces.

In view of these facts we decided to use the fermentation test in our regular dairy inspection work to determine its value as a means of detecting the principal source of bacterial contamination. Many regulations for milk control fix a maximum limit for bacteria and when this limit is exceeded the dairyman is merely notified or an inspector is sent to the farm to endeavor to discover the cause. A test that will point out the principal source of contamination in such cases would be of great assistance in improving the condition.

In our work, the method of counting bacteria approved by the American public health association, is one of the routine tests, but in order to obtain as much material as possible we did not confine our investigations in connection with the fermentation test to those instances in which the bacterial standard had been exceeded, but made an inspection at the farm whenever the result of the fermentation test seemed to make it desirable for our purpose. The result of the laboratory tests and farm inspections are given below:

Milk from Dairy Farm No. 1.—Fermentation test: Gaseous curd showing some peptonization, at the twelfth hour. Number of bacteria per cubic centimeter, 59,200.

On a visit to this farm it was found that the cows were standing in two rows, facing outward, with less than four feet space between the posterior ends of the animals. Almost every cow, in switching her tail, would strike the cow opposite her in the other row. When urine or soft manure was voided by a cow in one row it splashed upon the rear parts of the cow opposite in the other row and presumably, also upon the milker and into the milk bucket if they happened to be present at the time. Midway along the length of the rows of cows, and in the middle of the alley between the two cows, an iron rod four feet long and bent at the lower end to form a hook, was attached by the opposite end to the ceiling in such a manner as to permit it to be let down when desired. One of the stable men said this was used to hang the filled milk pails on until they could be carried out of the stable to the milk room, but at the time of the visit three filled milk pails were standing on the floor of the alley between the cows. In was in June and the cows were very busy switching at flies and the feces were soft and abundant. The conditions certainly favored fecal contamination of the milk.

Dairy Farm No. 2.—The dealer receiving the milk from this farm has bacterial counts made in his own establishment. From September to December the counts ran from 4,000,000 to 1,000,000, and the dealer requested an investigation. A sample of milk from the herd was examined in our laboratory in the latter part of December, with the following results: Fermentation test $J._2$, $P._1$. Number of bacteria per cubic centimeter, 22,800.

Inspection at the farm showed that the cows and stable were kept only fairly clean. It was also learned that the dry fodder was fed before milking and that straw was used for bedding. The milking was done with machines, but the last milk had to be removed by hand. During the milking of a cow it was not uncommon for one of the teat cups to fall off into the litter, the sucking action being continued while it lay there. In several instances it was also observed that soiled hairs on the udder had been drawn down into the mouth of the teat cup. The result of the curd test having indicated the predominence of the lactic acid forming bacteria, especial attention was given to the condition of the milk vessels and apparatus and the methods of cleaning them.

Small particles of coagulated milk were found on the inner surface of the buckets of the milking machines. The interior of the tubes and cups of the machines could not be examined, but there was good reason to believe that a similar condition existed there. After each milking, it was the custom to wash the tubes and cups with hot water from the boiler in the milk room and then place them in lime water until the next milking. The buckets were also washed with hot water. The dairyman was advised to rinse out the apparatus and buckets with cold water before washing with hot water, and also to feed the dry fodder after milking. There was no further complaint from the dealer regarding the milk. The conditions found confirmed the result of the fermentation test.

Milk from Dairy Farm No. 3.—Fermentations test: G_2, $P._1$. Number of bacteria per cubic centimeter, 4,740.

Inquiry developed that the men were late in getting to the barn in the morning and the stable and cows were not cleaned a sufficient time before milking to permit the dust to settle. This was in agreement with the indication of the fermentation test.

Milk from Dairy Farm No. 4.—Three samples of milk from this farm were examined at intervals of one week, with the following results:

First sample: Fermentation test, $P._3$, $G._2$. Number bacteria per cubic centimeter, 9,300, including many colonies of staphylococci.

Second sample: Fermentation test: $P._2$, $G._1$. Number bacteria per cubic centimeter, 25,800, including many colonies of staphylococci.

Third sample: Fermentation test: $P._1$, $G._2$. Number bacteria per cubic centimeter, 2,400.

The farm was visited two days after the last sample was examined. It was learned that at the time the milk represented by the first sample was produced there were three cows in the milking line with a vaginal discharge, the result of a retained placenta. At about the same time some excessively acid ensilage was reached in the silo and when this was fed to the cows it made many of them "scour," several so badly that they had to be treated for diarrhea. This condition continued for some time. On the day of the visit no cows were scouring, but the stable still showed some evidence of the condition that had existed. There was also one cow with a slight vaginal discharge—one of the three before referred to.

Staphylococci produce a peptonized curd and it is probable that they were largely responsible for the peptonization shown in these tests, the milk being contaminated with the vaginal discharge. The loose condition of the bowels would favor the contamination of the milk with the coli and aerogenes species. The indications of the fermentation test can be regarded, therefore, as confirmed.

Milk from Dairy Farm No. 5.—Fermentation test: $G._1$, $P._1$. Number of bacteria per cubic centimeters, 361,400. Numerous colonies of streptococci on plates.

When the farm was inspected the cows and stables were found to be soiled with manure. There were thirty-nine cows being milked and only one man to clean the stable and the cows, although he had the assistance of another man to milk. Three cows had alterations indicating catarrhal mastitis in the udder. The milk of one contained streptococci and leucocytes in large number, and in the milk of another numerous leucocytes were found. Neither streptococci nor an abnormal number of leucocytes were found in the milk of the other one.

The condition of the stable and cows corresponded with the result of the fermentation test.

Milk from Dairy Farm No. 6.—Fermentation test: $J._2$. $P._1$. Number of bacteria per cubic centimeter, 179,000. The number of bacteria per cubic centimeter in the milk from this farm had been running below 10,000 for more than a year and an investigation was, therefore, made to discover the cause of an increase. It was learned that during the colder parts of the year it is the custom at this place to store the milk over night in the milk house without ice, after it had run over the cooler and been bottled. In warm weather the milk is iced after being bottled. At the time the milk tested was bottled the weather turned suddenly warm in the evening, but no ice was used. After that day the milk was iced and the bacterial count returned to the usual number. No condition in the stable or in the cows and no defect in methods was discovered that would increase the bacteria in the milk.

The condition on the farm, therefore, confirmed the fermentation test.

Milk from Dairy Farm No. 7.—Fermentation test: $P._2$, $J._1$. Number of bacteria per cubic centimeter, 34,600. The bacterial content of this milk is usually below 8,000.

On the day the milk was produced from which the sample was taken, hay was being hauled to the barn and put into the loft above the cow stable. The unloading was done at one end of the barn where there were three doors opening into the stable, and was continued during the entire time the cows were milked in the afternoon. On this day the platforms were taken up in about one-half of the stalls in the stable and new ones put in.

The indications of the fermentation test were also confirmed in this case.

CONCLUSIONS.

In all seven investigations the fermentation test proved to be a correct criterion of the principal source of bacterial contamination and was of material assistance in discovering the cause. We are not unmindful of the fact that our cases were rather few and that it would be desirable to have a larger number, but we are of the opinion that the results obtained indicate that the fermentation test is likely to prove of great value for the purpose mentioned.

DISCUSSION.

Dr. G. A. Roberts: In bacterial contamination of the milk numbers is not a very accurate criterion to go by. In Raleigh, North Carolina, for a number of years we have attempted to better our milk supply and have found great difficulty in getting any standard that would materially assist us. The inspector, but we hope to have a veterinarian soon,* has been very much opposed to the inspection work himself, and in order to show the disrespect or disregard he held for the bacterial count test, placed in several instances, feces in the samples of milk and sent them to the laboratory; if the fermentation test is going to be practical it will be a material step forward and aid toward getting an improvement in the miserable milk supply as observed by many of us.

Dr. Fitzpatrick: I quite agree with Dr. Roberts when he suggests the need of something to bring about a better milk supply. I am located near where the milk supply of Philadelphia is gathered for distribution. Some years ago, before the veterinarians had any standing in Pennsylvania, many of the milk inspectors were not qualified to properly conduct milk inspection, and it was during that period that I became interested in the milk supply, later associating myself for a term of two years with Dr. Bergy of the University of Pennsylvania, to give special study to the bacterial content of milk. On one occasion there was considerable excitement over what was termed "bloody milk," shipped from a certain dealer; upon investigating the condition and finding no evidences of disease among the

* Dr. James A. Rudolph was appointed meat and milk inspector, October first, nineteen twelve.

animals, I caused a bacteriologic examination to be made, and discovered the cause to be a chromogenic variety of bacteria. The following week I was requested to look over a herd of imported Holstein cattle, that were giving only 2.80 per cent of butter fats and thus causing the destruction of about seven hundred quarts of milk. The product was tested and found to be good, healthy and pure milk, and, moreover, the cattle had been tested by myself and two other veterinarians before coming into the country and were found healthy. Those familiar with laboratory work can differentiate between diseased and pure milk. We must get the educated veterinarian on the job to detect these pathologic conditions. It is not that we need insist upon a higher percentage of butter fats so much as we want good, healthy milk.

I found the lactic bacteria produced in many instances as an associate of dirty cans and instances where unsanitary dairies were using hydrochloric acid about the creamery to coagulate the casein, and permitting the dirt to be coagulated in the casein at the bottom of the can. One prominent ice cream manufacturer almost lost his reputation because of this coagulation produced in the bottom of the cans, giving his cream a bad taste. Cleanliness should be looked after more carefully than it is. An ordinary layman can take a Babcock machine and test the quality of milk, but this will not show the quantitative or qualitative bacteriologic condition of the milk, and all this clearly shows the necessity of having a qualitative bacteriologic test instead of merely a milk qualitative test, for, naturally, we want to know if there is any infection in the milk supply.

Dr. A. T. Kinsley: I am very much interested in Dr. Klein's paper and think he should be congratulated upon the work he has done. I would like to ask the Doctor if all the experiments he conducted were so positive and conclusive as those he reported? Further, is it as easy to recognize the different types of coagulations as the paper would lead us to believe?

Dr. Klein: These tests were made in the laboratory of the veterinary school by Dr. Campbell and reported to me. I went to the farms with the information and succeeded every time in locating the cause of the trouble. In one or two instances the dairyman was asked first what had occurred unusual on the day the milk was produced. It was usually the third day after the milk was produced that I went to the farm. In one case where a peptonized curd was produced in the milk the manager and myself went over the ground and neither of us could find the cause of the trouble. After I left he investigated and on going to the stables early the next morning, at the time the men should have been there to clean the cows and stable he found that they were not there. Thus it was by means of this test that he was able to discover that his men were not getting out in the morning in time to clean the cows and the stables.

Dr. Kinsley: I want to know if you have any other cases where the results were not quite so clear?

Dr. Klein: All of our cases are reported in this paper. I do not think anyone would have any trouble in making the test. The jelly like curd is very characteristic; it is solid, white and homogenous. Sometimes there

is a depression in the side of the curd where gas has formed and passed up. Most of the lactic acid organisms, or many of them, form a little gas. A jelly-like curd with a few gas furrows and gas holes is quite different from a gaseous curd. The peptonized curd is entirely different in appearance; it is not entirely white like the jelly-like curd but has a dirty tinge, is contracted and does not stand out like the jelly-like curd, but has a drawn appearance, except when it is of the mushy type.

I think anyone who will make the test and practice for a few days will be able to differentiate the different types. Barthel published a book on milk tests which contains an illustration of the types of curd taken from Wyssmann and Peter's book.

Dr. Ridge: I do some of the field work collecting the samples, and at first was not very enthusiastic in regard to the tests, but have become more so. I take the samples from the different towns, usually collecting about twenty-four to thirty samples. Of course the office does not know the conditions under which they are collected, but I have watched the results to see if they are correct, and have been struck with the accuracy of every test Dr. Klein has made.

Dr. Klein: I want to observe that the tests Dr. Ridge mentions are not included in my paper. This work was done prior to the work he mentions. After the completion of the work recorded we adopted the fermentation test as one of the tests for the milk sent in by the inspectors and it brings out the point that the number of bacteria is not the whole thing in judging the quality of milk. That has been realized for a long time, but there has been no practical method of determining the kind of bacteria that are present. This is a practical method, I believe, for determining the predominating group of bacteria and the kind of fermentation or decomposition occurring or likely to occur in the milk. It is an old test used by cheese makers to determine whether the milk brought in from the farms is suitable for cheese making.

Dr. Keane: A majority of the conditions you found and that were corroborated by the test will ordinarily be found without the test, will they not?

Dr. Klein: I cannot say that would be true in all cases. In the first place, you usually get to the farms some time after the milk examined in the laboratory was produced. I reached the places usually about three days after the milk that was tested was produced, and, of course, if I had been there at the time I would probably have observed most of the conditions. Take the case where the milk vessels were not being cleansed properly, where the man was running in hot water first instead of rinsing with cold water? A man could not have seen that without staying all day. In dairy inspection work that is not possible. If the inspector has to inspect four or five farms in a day he cannot be at any one of them long enough to see all the operations and only a test of this kind can control the things that go on on the dairy farms.

Dr. Archibald: This strikes me as a very important question and I believe those of you who have worked along bacterial lines in connection with dairying work recognize the necessity of perfecting means of making some qualitative test. Heretofore we have had to rely on the

quantitative. If we can perfect a qualitative test and find the kind of organisms that predominate in the milk it will give us the source of those organisms.

Dr. Dalrymple: It seems to me that if this method is perfected, and becomes universal, it will be a great addition to the equipment of the public health service. There is a tendency at the present time to establish courses in hygiene, covering as much as four years, to educate inspectors for the public health service.

I think the universities of Michigan and Harvard already have such courses, and also that the Royal sanitary institute of London, has a course of this nature. There has been some thought of establishing a similar course at the Louisiana state university. These courses are designed to educate the public health inspector, or young men who expect to take up this public service work.

Naturally, in a four years' course of this kind, pertinent allied subjects would be injected to make it as complete as possible.

In the matter of milk inspection, it would tend to bring about a condition that would be of great service to the public.

THE STANDING OF THE VETERINARY PRACTITIONER IN THE SOUTH.

By E. M. Ranck,

Agricultural College, Mississippi.

It has been some time since the writer has appeared before this body in the capacity of an essayist. Your chairman of the section on "practice" invited me to add my mite to the already full, scientific and interesting programme. It is not my intention to bore you with any special topic but a few remarks of rather general nature pertaining to conditions in the south and the relation of those conditions to our profession.

"The stream is no higher than its source" is certainly applicable to the veterinary profession all over the world, and in the south it is, I believe, on a higher plane everything considered. In some southern states there are no laws governing practice, and in those where laws are in force they are perhaps on little better standing than where they do not exist. The enactment of these laws, however, has been an up-hill fight but it is only a question of time when all will have improved and up to date regulations.

The south is proud of its representatives in our profession, especially those who have spent their lives in usefulness and enthusiasm, ever holding the banner of progress and dignity at the mast head of their craft, sailing toward the goal of the "New Era" in Dixie land.

The quotation of our beloved Governor Brewer of Mississippi, "It is an honor to be a manly man" is applicable to our field of energy. The south is often looked upon as an undesirable place to practice, but one has only to come here to see the great opportunities. The northern publications as a rule only print the worst tales they hear and nothing of the finer and lovable characteristics of the southern home life.

It is true that in some places of the south if a man is bad enough to get to jail he never gets there. It would be better if some communities in the north had some such unwritten law. It is safer in the towns of the south for an unattended lady to

return from church or place of amusement late in the evening, than in many of the so-called safe towns in the north.

It is useless for me to try to impress upon the older practitioners in our profession the great possibilities offered in the south. These men are already settled in their life's work and in places where their numerous interests will hold them the remainder of their days. I wish to draw the attention of the young graduate who has all of his life before him and is entering upon his chosen professional life to the south. It will not be well to be too general, and being familiar with conditions in Mississippi, I will confine myself to facts as they exist in my adopted state.

More than nine years ago we cast our lot in a southern state and to this time we have not regretted the move. It seemed strange at first to be the only practitioner in a range of territory having no competitor nearer than seventy-five or one hundred miles; no fellow veterinarians to consult and most of all, no associations to attend. It seemed lonely indeed at times, but after a while one becomes accustomed to anything and in cases of this kind it is well to consult your books which under the circumstances seem better friends than you ever dreamed them to be.

So far as general practice is concerned one will find in the south everything in the category of diseases that exists in the north, besides this, some that are indigenous to that part of the country but not common in the north, as tick fever, etc.

Where good, ethical, clean, moral, dignified men have practiced the road is comparatively smooth to a new man, but where quacks, traveling emperics, imposters, and fakirs have traveled over the country one. finds the general public rather skeptical of the incomer until they are sure of the man.

The southern farm and stock papers are doing much to overcome this prejudice. Outside of some of them taking fake advertisements they are doing us a lot of good and right here let me suggest that we should boycott farm or stock papers all over the country that insist upon taking fake veterinary advertisements.

As to the fees it is just as easy to get proper pay for work as in any other part of the country. Of course we have the cheap traveling men, but the southern planter has long since learned that it is poor economy to have cheap work done as it has often cost him more in the end. In other words, cheap work has been

so very unsatisfactory that he has about abandoned it. I find it is a good plan to consult with medical practitioners along these lines. It is best to base the charges of our work on the same basis as theirs and it usually works out all right. This especially applies to visits both near by and country calls.

It pays to cultivate the acquaintance of the physicians and druggists for they will really do you more good than the livery stable men and moreover a new practitioner should be very careful as to his location. Veterinary hospitals in the south in small towns are not necessary nor are they a financial success. One must be equipped to do his operating out in the open and frequently without very much help, and if any it is of the crudest kind.

It frequently occurs that you have to go to a large plantation and do all kinds of work from dentistry to general operating, indeed often times microscopic work, these trips are usually made at a day rate and frequently several planters will have their animals at one place thus keeping you busy all day.

In Mississippi there is a regulation of the state live stock sanitary board providing for a number of assistant state veterinarians who are not on the state payroll, but receive their pay from the county board of supervisors or the people for whom the work is done. In a number of counties in the state no qualified veterinarians are located and it is my opinion that a good practice could be established by a man that was trained and willing to wait a little while before making a fortune.

I have noticed that in some little country towns, in some instances far from the railroads, and in good agricultural districts where plenty of good work stock is used, no man in our profession is located but several very well-to-do physicians are busy all the time have accumulated fortunes, and on inquiry one will discover that they have made the money and attained their success by sticking to it, by so doing making good. I have seen instances where it looked impossible to find enough work for one man in either branch of medicine; a place that in the course of several years could boast of several very prosperous practitioners.

The federal government has done much to help our profession in the south. We are represented in the bureau of animal industry in the eradication of the cattle tick in districts where no competent veterinarian has ever been and would not now be were it not for the work along these lines. People gradually see the advantages gained through tick eradication work and are educated to the

necessity of its proper handling by men trained for that purpose. Let me say that when we have accomplished this work in the south it will be the greatest stock country in the United States. We have untold advantages which it is not necessary to explain.

The south has been compelled to turn its attention to live stock, this necessarily involving changes. These are coming like a whirlwind. Mississippi has during the last few years imported more blooded hogs and cattle than any other state in the union, getting them from the north but in a few years we will be selling the northern farmer better stock than he is now selling us. We are trying to protect the stock raiser in our state, by requiring certificates of health to accompany all animals imported. This law in some instances perhaps is not as strictly adhered to as it should be, but we are doing much better than some northern states where veterinarians abound in large numbers.

It is very necessary for our men to be broad and informed on general topics relative to feeding and raising stock, and not simply trained to look after the ills of animals. The national reputations of Dalrymple, Butler, and Cary are not due to their superior knowledge of practice or surgery, but to animal husbandry and agricultural knowledge as applied to veterinary topics.

People want to know what stock to raise, how to raise it, what to feed and how to grow it, how to prepare and put stock on the market to obtain highest prices. The practitioner in our line in the north has very little to do with this end, but the southern man must be familiar with all these matters.

Socially our professional men are as well taken care of in the south as the north; a social standing depends upon the desires of the man, his family and his capability.

From a health standpoint we are blessed in the south, having just as many or more long lived people as in the north; no more malaria than in some states along the coast in the north and have demonstrated that we can take care of ourselves in any sort of an epidemic. Fewer people would run from an outbreak of yellow fever in New Orleans to-day than from New York if an outbreak occurred at both places simultaneously.

We have plenty of districts in the gulf states where the stegomya or anopheles are unknown, and where they abound they are under partial control, even in swamps. In nearly ten years of active practice I have had less cases of heat prostration among horses than you could count on your fingers and have yet to see

or hear of the first case of its occurrence in man.* If you will consult the climatologic maps of the gulf states and compare them with the coast states you will find our climate surprisingly healthy.

With the coming of the automobile we are getting good roads which mean prosperity; lands that were selling a few years ago for three to five dollars an acre are now bringing fifteen and they will grow yearly two as good crops as your one hundred dollar land will grow one.

We believe the south is the coming country; we believe it has the greatest possibilities of any section on account of the canal; we know it is going to be a wonderful stock country, and we have already a two hundred thousand dollar packing plant running all the time in the extreme southwest section of Mississippi.

Great financiers are turning their attention south. Even politicians have lately turned their attention our way and looked with envy on us, for what little favors they could glean.

The intention of this paper is not to advertise our country, but to draw the attention of young men just out of college who are looking around for a location and emphasize that the future possibilities of the south are greater than anywhere else that he may cast his lot; moreover if he is properly trained, has manhood, pluck and honesty, he can do well anywhere, but we believe he can do better here than in any other section in this country as we can assure him he is needed and that his services will be well paid for.

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*Since this paper was written several cases of heat prostration have occurred in New Orleans; the first reported in that part of the south.

* CLINICAL INSTRUCTION.

By Dr. A. T. Kinsley,
Kansas City, Missouri.

The present methods of instruction are materially different than those that were in vogue a few decades ago. Laboratory instruction, in-so-far as possible, is now substituted for didactic courses, and in those courses in which laboratory exercises cannot be substituted, experimental demonstrations have been added to make the subjects more comprehensible. This change in teaching methods, according to our best educators, affords a greater opportunity of individual development.

Clinics are laboratory demonstrations of diagnosis, practice of medicine and surgery. It is universally accepted that clinical instruction should be included in the *curriculum of the courses* in comparative medicine. But the methods of giving this instruction are variable, in different institutions, as well as the time in the course provided for it.

A brief letter, with twenty questions enclosed, was sent to the proper officials of each of the following twenty-four veterinary college:

Chicago Veterinary College,
Grand Rapids Veterinary College,
Kansas City Veterinary College,
New York-American Veterinary College,
Terre Haute Veterinary College,
Cincinnati Veterinary College,
Indianapolis Veterinary College,
McKillip Veterinary College,
San Francisco Veterinary College,
St. Joseph Veterinary College,
United States College of Veterinary Surgeons,
New York State Veterinary College,
Veterinary Department, Alabama Polytechnic Institute,
Veterinary Department, State Agricultural College, Colorado,
Veterinary Department, State Agricultural and Mechanical College, Iowa,
Veterinary Department, State Agricultural College, Kansas,

*Contributed to the report of Committee on Intelligence and Education.

Veterinary Department, State University, Ohio,
Veterinary Department, University of Pennsylvania,
Veterinary Department, State Agricultural College, Washington,
Veterinary Department, Laval University, Montreal,
Veterinary Department, Michigan Agricultural College,
Veterinary Department, University of Ontario,
Veterinary Department, George Washington University,
Veterinary Department, North Dakota Agricultural College.

In addition to the information obtained by correspondence, some idea of the methods of giving clinical instruction has been obtained by personal observation.

It is possible that some members present are not familiar with the methods of giving clinical instruction, and in order to make it clear, a few clinics that have been observed will be described.

Clinic No. 1. Some of the students were seated, and were primarily concerned in conversation among themselves. A few of the students assembled around the patient, which in this instance was a horse. About fifteen minutes after the scheduled time, the clinician appeared and without any discussion as to the history of case, diagnosis or reasons for operative procedure, confined the patient, applied actual cautery, removed confining appliances, gathered up his instruments and left the room without saying a word, the patient being taken out by an attendant. Then the students filed out of the clinic room. The time consumed in this clinic was less than one-half hour. The information obtained by the students from such a clinic would be meager, to say the least.

Clinic No. 2. A horse patient was brought by the owner to the hospital of a veterinary college. A senior student in charge of clinics for that period had the animal tied in a retention stall, obtained the owner's name and address and filled in a report card. In the meantime, the horse lay down and attempted to roll. The student, without further examination, diagnosed the condition as colic and asked two other students who were in the dispensatory, and who had not seen the case, to prescribe, which they did, and promptly administered that which they had prescribed without any examination of the patient.

Clinic No. 3. An autopsy; clinician was discussing lesions found, a few students were taking notes, some others were talking, while still others stepped out into a court and were playing cards.

Clinic No. 4. Poorly ventilated room, time midwinter, students

assembled, boisterous talk, many smoking; enters clinician twenty minutes late, asked a student to bring a certain patient from hospital. Clinician lights cigar, smoke so dense and air so foul that an unaccustomed spectator had difficulty in remaining. Patient a horse, was then led in and the treatment of the case, which was said to be one of catarrhal pneumonia, was briefly discussed. No reference was made to history, diagnosis, probable lesions existing, nor reasons for the medication with certain drugs mentioned. Entire clinic consumed less than twenty minutes.

Clinic No. 5. Patient, a horse, affected with cartilaginous quittor. Students confined patient and prepared operative field. Clinician appeared with instruments in tray. Operation began and the operator proceeded until the operation was completed. Then picking up tray with instruments, the clinician went directly to his office, without any discussion of the case. While this clinic was in progress several groups of students were relating stories of an immoral nature and frequently using language unbecoming any gentleman.

It is needless to say that the foregoing clinics were valueless to the students. and degrading to the veterinary profession. Such clinics are not confined and found only in some of the private colleges, but they are also found in the veterinary departments of some of the universities. And no doubt these inferior clinics is one of the things that is responsible for some of the inferior practitioners, and is also a mighty factor in preventing the proper recognition of the veterinarian, locally and nationally.

Clinical instruction cannot be given in exactly the same way in the different veterinary colleges, as conditions are essentially different. Instruction in clinics may be provided by a daily clinic, conducted in a clinical amphitheater, by hospital assignment, by ambulatory or out clinics and by apprenticeship with practitioners.

Daily clinics, for one or more classes, given at a regular scheduled time, are very valuable if the right kind and a variety of cases are provided, and a good clinician is in charge. In the daily clinics all students should be required to make reports that should be collected at the end of the clinic hour, graded and returned to the students. Some means, other than roll call, should be installed to ascertain student attendance at clinics.

Daily clinics may be diagnostic, medical, surgical or necroptic. From two to six students should be assigned to assist in the

daily clinics; the class of students participating being determined by the nature of the case. The clinician should give all the general information that is known, particularly the history of the case, and discuss points that have any bearing on the case under consideration. In diagnostic clinics, it is advisable to assign two or more students to the case and have them make a thorough examination of the patient, with the clinician, and when they have completed their examination, and agreed upon the diagnosis, the clinician should announce their findings. The clinician should ask different students assigned to the case to point out the leading symptoms, and thus each element of the symptom complex of the disease, or diseased condition is demonstrated upon the afflicted animal by a student before the student body. A good diagnostic clinician is one who accurately and specifically describes the lesions responsible for the symptoms evidenced.

Surgical clinics, particularly when major operations are to be performed, should for the best results, especially when there are many students, be conducted by two clinicians. The chief clinician should give the history of the case, the anatomy of the parts, and briefly discuss the technique of the operation, stating clearly the benefits to be obtained by the operations. And while the chief clinician is discussing the case, the assistant clinician with the assistance of two or more students, should be confining, and if necessary, anesthetizing the patient. When the animal is properly prepared, the chief clinician begins operating, and at the same time, the assistant clinician describes concisely each successive step in the operation, indicating structures incised, severed, elevated, etc., and also mentioning any special instrument and how it is used. When the operation is completed, the chief clinician should discuss the after treatment, any complication that may arise, and methods of treating same.

The method of conducting daily medical clinics necessarily varies according to the case. Assignment of students to assist and particularly in the diagnosis of the case, is usually an advantage. The diagnosis having been determined, the clinician should discuss the lesion existing and the therapeutic agents indicated. After the pathology and therapeutics of the disease have been elucidated, the sanitary conditions and the food requirements should be given in detail. The clinician should indicate the basis for giving a correct prognosis. One very important considera-

tion of diagnostic, medical and surgical clinics that is usually not properly provided for, is the return of cases to demonstrate the progress of the disease or the results of surgical operations. Some provision should be made for the return of all clinical cases or, at least, a report given of their condition.

Necroptic clinics are of considerable value and every college should provide means of conducting necropsies in order that the students may become familiar with this very important phase of diagnosis. Students should be assigned to assist in the autopsy. The clinician should first give a detailed history of the case, giving ante-mortem diagnosis, if such has been determined. The cadaver should then be carefully inspected for identification marks, external injuries, bruises, etc. A regular system of autopsying should be rigidly followed so that the students may become familiar with a definite plan. All lesions found should be discussed, giving, if possible, the reasons for them. If the classes are large, autopsy lesions, in many cases, may be conveniently placed in trays and passed around, so that all students can have a close view of them. When the autopsy is completed, a summary of the lesions found should be given, and if possible, an exact diagnosis and recommendations as to disposal of such carcasses. And last, but not least, the student should be taught how to care for autopsy instruments.

Hospital clinical instruction is of particular value in demonstrating special attitudes that animals assume in certain diseases, in observing certain symptoms such as inappetence, excessive or diminished elimination of urine, character and quantity of feces, etc. In other words, the students has the opportunity to study the diseased animal in every phase in the hospital. To obtain best results, the clinical instructor should be present while the student is observing the patient in order that the correct idea of the interpretations of symptoms, prescribed treatment and dietary recommendations may be thoroughly explained and comprehended by the student. A report should be filed by the student after each day's observation, and to be most beneficial, hospital clinic assignments should be made for several successive days. Succeeding assignments should be made on different kinds of cases in order that the student's knowledge may become as general as possible.

Ambulatory, or out clinics, are of particular value in permitting the student to become familiar with the business relations between the veterinarian and the client, and are of further value

because of the fact that certain types of cases are observed that are under ordinary conditions not available in daily clinics, or in hospital clinics. In ambulatory clinics the students are of service to the clinician and obtain ideas of the methods resorted to when every convenience of the hospital is not at hand. The most serious objection to ambulatory clinics is the time consumed, and unless extensive equipment is maintained, only a few students can receive such training. Some colleges have found that the cases available in the ordinary ambulatory, or out clinic, can usually be obtained and hauled to the college in an ambulance, and thus a large number of students can have the opportunity of observing such cases, whereas only a relatively few students can be conveyed to the patient. Time is conserved, which probably more than offsets any difference that would otherwise be in favor of the long-trip ambulatory clinics. Records should be made by the students of the cases observed in out clinics, and the practitioner in charge of the clinic should discuss the case as in a daily clinic.

Another rather serious error that is made in practically all veterinary college clinics, is the constant use of a type of equipment that is not available for the graduate when he enters the field of practice. The ordinary beginner in practice has more difficulty in the control of patients than he has in operative procedures, and although the various colleges give a course in surgical exercises and restraint, the student does not become sufficiently familiar with the various methods of restraint. Methods of confining and controlling by other means than operating tables and stocks, should be demonstrated in daily clinics.

Educators, boards of control and the faculty of the various veterinary colleges do not have the same opinion as to the time in the course of study that clinical instruction should be given. But variation in the arrangement of subjects in the curricula is probably largely responsible for the assignment of unequal portions of clinical instruction in different sessions. That first year men receive benefit from properly conducted daily clinics cannot be disputed, and if the clinician is familiar with the course of study, freshmen clinical instruction can be made very valuable as a fore-runner to the remainder of the course. Clinical instruction is more readily comprehended by the advanced students, but on the other hand, clinical instruction is of value in preparing the

student for advanced work, and thus there is argument both in favor of, and against, clinical instruction at any given time.

Clinical instruction, to be of the greatest value, should include diagnostic, medical, surgical and necroptic cases in proper relation. Some colleges give an excessive number of surgical clinics while others give relatively few. Again, only a very few colleges provide bovine, ovine, porcine and avian clinics, the equine clinics being far in excess. This defect in our clinics should be corrected, for the veterinary practitioner is finding that a considerable portion of his revenue is derived from cattle, sheep, hog and chicken practice. Dog and cat clinics are usually in excess, particularly in clinics of veferinary colleges located in cities. This is clearly an injustice to the students, as relatively few veterinarians have extensive canine and feline practices.

Clinical instruction under the supervision of regular practitioners during vacational periods should be encouraged. It is true that some practitioners are not good instructors, but a real student should be capable of obtaining considerable clinical knowledge by observation even with limited instruction. Some have said "vacational clinical instruction with few exceptions is detrimental." This is a sweeping statement and is not in accord with the opinion of many educators. The statement implies an inability of the practitioners to impart knowledge to students. Many teachers, in fact, it is probable that any teacher can obtain valuable information from ordinary practitioners and there is no doubt but what veterinary students could obtain much information by vacational sojourns with practitioners.

From the information obtained and that which has been briefly given, it is apparent that in most instances the greatest amount of knowledge is obtained from the daily clinic. Hospital clinics and ambulatory clinics are of value when properly conducted. Some colleges are still too indifferent as to decorum in clinics. A few colleges appear to exert no effort in obtaining other than horse and dog patients for clinics, and in some instances, surgical clinics are far in excess of all other kinds. The number of clinicians is an item worthy of consideration. One college has only three. It is evident that a larger number would be of greater value. One other serious defect in the clinical instruction of many colleges is the failure of knowing when students are actually in attendance. This applies particularly to colleges having a large attendance.

Because of the apparent lack of attention on the part of the managing boards and faculties of veterinary colleges, in providing suitable clinical instruction, it seems advisable that the Committee appointed by this Association to inspect veterinary colleges, should especially investigate this phase of veterinary education.

*NEGLECTED FEATURES IN MOST COURSES AS NOW OFFERED.

By K. W. Stouder,

Manhattan, Kansas.

Most of us concede our scientific training is not yet perfection and considerable effort is being expended to improve that portion of our work; moreover, as the times demand it, there is every promise that the future will see continued progress in this sphere of veterinary education. Competition is becoming sharper, clients are becoming more intelligent and learning to discriminate, therefore demanding the services of better trained men.

Every man, though laboring for a competence, who has also lived for the uplift of a comparatively young profession, realizes that the limelight of public inquiry is constantly turned our way, noting out improvements or shortcoming as the case may be. A moment's consideration will convince one that any profession boasting many members must of necessity embrace many classes of temperaments, therefore, variations of conduct are certain to ensue. With due consideration for the great need of more fundamental education and greater perfection in our scientific attainments can we not stop and consider for a moment at least some of the other phases of our scheme of education to see if perfection has been or can be attained.

We all know that not one of us ever reaches perfection, especially in the practice of the golden rule, for human nature is weak. A person occupying a position where the work of many men is somewhat on review and acting as advisor, interviewer or arbitrator is at times deeply impressed with the lack of a code of ethics among some men in daily life. It is probably safe to say that certain men see no need for such a code and others would not appreciate its value once explained. This is probably due to the fact that these individuals are naturally so constituted that such ideas do not appeal to them and during the formative period of their professional lives they have not received

*Contributed to the report of Committee on Intelligence and Education.

enough suggestions along such lines. I think we all agree that improvement could be made in the breadth of mind and generosity of viewpoint among the future members of the profession if those in exemplary positions would teach and practice a code of ethics which would discourage unethical relations at times manifest among some men toward professional brethren. Our code of ethics as now known is broad enough, but is not drawn as it should be to the attention of men in the formative period of their lives. Some time and especial attention should be devoted to this subject by every faculty.

While it is very true that a good name is rather to be chosen than great riches at the same time a modest competence is convenient,. the latter is undoubtedly expected by most young men when entering upon a life's work for if not some other line would be selected. After an opportunity to observe a large number of men at their daily work one is impressed with the fact that some enjoying, at least no better and at times not so good training or opportunities often make far better financial successes than others.

Granting that the personal equation is of necessity a big factor in such matters it is quite as true that the lack of financial ability may be due to specialization along other lines or result through lack of natural inherent tendencies along such lines. On the other hand it is surely true that money and time spent in gaining an education should be recompensed and that the compensation obtained for services rendered is often too small. The reason for this is frequently because they have established a scale of prices at a time when they were hardly competent to judge the true value of their service. It would seem that there are many men who do not know what charges are just to client or to themselves for the services rendered, for as a matter of fact, nearly every day information is sought on these subjects in our offices and it is fair to assume that others in like capacities have similar questions propounded.

It is very true that it is quite impossible to establish a fixed scale of prices for every service a veterinarian is called upon to render and if it could be it is very doubtful if it would be desirable to attempt such a system; moreover, it is equally true that the same service varies in its value in different sections of this country and that there are also other factors operative to interfere with this desire for uniform charges. These are gen-

eralities, however, that are always more or less constant and can be given due weight at the proper time. It would seem to be quite desirable to retain as clinicians only such men as are in close touch with the active business end of the profession and who, after a thorough discussion of every case, are quite capable of commenting upon the charges proper in each instance and willing to offer explanations so that students might have a better comprehension of this phase of the work, for naturally, many will for a time at least enter private practice. This course should include instruction as to the best manner of meeting clients and examples of methods for conducting business in detail. Such a course in veterinary business training could be easily handled by practical men who can offer reasonably good facilities and demonstrate practical experience without great additional effort; a system of this sort would materially assist young men during the critical period of their lives.

In the majority of colleges no attention is given to a course on jurisprudence and the conduct and ideas prevailing with some practitioners when called upon as expert witnesses or when advising with clients in legal procedure or, again, on live stock laws frequently reflects the need of such instruction. These courses need not consume a great deal of time but can be made highly profitable and seems highly essential to the making of a well finished, capable man able to cope with conditions to the best advantage.

For many years federal and state laws have existed for the control of interstate traffic in live stock, yet graduates of many of our schools are not familiar with the laws of the states in which they expect to practice and many do not seem to comprehend why these laws exist, if we may judge by the purposes to which they attempt to put them at times; again, many have no knowledge of the source to inform themselves of the necessary procedure to obtain information pertaining to proper transfer of stock from one state to another. The very fact that the work is so conducted as to appear to be without regularity often results, as is well known, in an owner or shipper undertaking interstate traffic with an improperly made health certificate causing unwarranted detention, additional expense and the individual naturally learns to feel that all such laws are made to help supply fees for veterinary inspectors. This may be an indirect but

undoubtedly a potent factor in combatting legislation much needed to control live stock movement.

If some instruction were given in the work of properly certifying stock for interstate shipment our work along such lines would soon be in a better light before the public and every man no matter how small his village of headquarters would soon understand that he has no excuse for not being informed regarding the laws with which he must comply in order to aid his client in reaching a certain destination, and this without delay or annoyance. It is to be hoped that the recently organized association of state and provincial veterinarians of North America will press this matter so as to clarify the situation.

*TOPICS RELATING TO VETERINARY EDUCATION.

By E. A. A. Grange,

Toronto, Canada.

The preparation of veterinary students for examinations other than those which are conducted at the various veterinary colleges, has appealed to me as a subject worthy of perhaps, fuller consideration than has been customary in the past. Especially to those who are to a large extent responsible for the desired education of the young men, who come to an institution for the kind of education, which is demanded by the public; moreover, in these days when the various sciences which are indelibly linked with veterinary education are themselves splitting up and ramifying in so many different directions, it is not easy for a college to lay out a three- or even a four-year course so as to meet the requirements of all sorts and conditions of the innumerable localities of so vast a territory as North America, especially in preparing students for examinations before outside boards of examiners, be they individual state boards, provincial boards or even federal boards.

One reason for making my suggestions is because of the great variety of text books used and different authorities quoted in the daily routine of college training, that it is difficult if not impossible for a faculty to teach all the subjects of veterinary science in a three- or four-year course in anything like a thorough manner, and still be in line with the teachings of the various authorities.

Another reason is that certain boards of examiners may very largely represent a particular college, consequently questions which are asked and answers which are required for a pass mark, may be entirely different from those which are taught in some other college; take the subject of materia medica for instance, an examiner may be highly impressed with the efficiency of a few drugs which are unnoticed in the teaching of another, or other colleges; and his questions may all be upon the aforesaid few drugs in which case the candidate although well informed in

* Contributed to the report of Committee on Intelligence and Education.

this particular subject in a general way, is entirely ignorant concerning the aforesaid drugs and his examination is rejected. The foregoing principle will apply in chemistry, botany, pathology, sporadic diseases, contagious diseases, anatomy, and so on throughout the entire curriculum.

In an effort to overcome the foregoing difficulties and put the various examinations, on say, a uniform basis, I beg to suggest anatomy two hundred more or less; for materia medica one hundred and fifty more or less; for surgery one hundred more or less; for bacteriology one hundred and fifty more or less; and so on for all the branches on which veterinary examinations are held. At the time the examination is to be held give each examiner a set of the questions on his special subject letting him select ten of them, more or less, from the list, or arrange it in some way that the examination would be confined to the questions printed and distributed upon the subject.

Another question in which veterinary education is concerned is in the preparation of calendars or catalogues for information of intending students or others who are interested in the welfare of our profession and in this connection I think it would be a good thing if all our colleges could be prevailed upon to publish a full list of questions of their final examinations, together with the names of examiners. Such a procedure would in my opinion, give the profession at large, as well as laymen a good idea of that which is being taught at the various colleges.

THE CLINIC.

Aside from the afternoon session Tuesday, Aug. 27, 1912,* the section on surgery convened at the Indiana Veterinary College to conduct a surgical clinic. This was formally opened at 9 a. m., Wednesday, Sept. 28, 1912. Fifth Vice-President G. H. Roberts, presiding.

Sessions were also held at the same hour upon Thursday and Friday. Under the directorship of Dr. J. W. Klotz, demonstrations were conducted simultaneously in the large college amphitheater, as well as in a large and a small operating room. All these places were amply equipped with operating tables and other appurtenances necessary for modern surgery.

Many demonstrations were performed on the operating tables, but the large number of animals submitted made it necessary to resort to the older method of casting on the floor of the amphitheater, where there was plenty of space not occupied by the operating table; also, several operations were performed in stalls, so that during some portion of the clinic there were three and even more operations going on at one time.

A new feature in connection with the clinic was the lecture given by the operator either prior to operating, during or following his labors.

The material presented during the several sessions and discussion was as follows:

CLINICAL CASES.

Case 1.—Bay gelding, diagnosis malignant tumor. Clinician, W. L. Williams, Ithaca, New York.

Dr. Williams: (The animal having been led into the amphitheatre for inspection.) This horse is about ten years old, and about twelve weeks ago it was noted that he had some difficulty in respiration. It became necessary to perform tracheotomy on account of the dyspnea. He can swallow neither water nor food with any degree of comfort or with any expedition.

On examination we find that the horse has a new-growth in the throat which is situated between the epiglottis and the tongue. The palate is also hardened and is unfortunately so thickened that it is exceedingly difficult

*See Section on Surgery, page 32.

to reach back to the epiglottis. I asked Dr. Frost to palpate the parts as he has a longer forearm and fingers and he succeeded in reaching the epiglottis which he found free but the tumor involves the palate.

One feature is that upon applying the speculum we find it difficult for the horse to open his mouth, which materially interfered with the examination. Of just what is the extent of the tumor it is difficult to say at this time but it probably involves a large part of the pharynx. I should say, however, from its softness, its readiness to bleed, and also from the character of the pus that it is of a malignant nature.

Destruction being advised and agreed to by the owner the lesions discovered upon subsequent post-mortem examination were exhibited before the clinic.

Dr. W. L. Williams: We find that the autopsy of the animal justifies the diagnosis and no new growths were discovered in other parts of the body.

On dissecting the head a tumor was discovered about the large branch of the hyoid bone, some four to five inches in diameter and weighing probably half a pound. The tumor passes in front of the epiglottis and at the base of the tongue, involving the soft palate in the malignant new growth which is quite thick directly up to the palatine bone, which is also involved.

In front of the larynx and upon the left side superiorly, the tumor appears to be invading or pressing upon the larynx and the pharynx, thus interfering with deglutition and respiration. The tumor is malignant and probably carcinomatous.

Case 2.—Bay mare. Fistula of withers. Clinician, W. A. Axby, Harrison, Ohio.

Dr. W. A. Axby: History of case very obscure. When the horse came in yesterday the supposition was that there existed a tract of considerable depth. We will make an examination and later disclose our findings. (Animal confined on table and operation proceeded with.) This is apparently an old chronic condition showing the effects of applications of caustics but it has never been operated upon to any extent, at least. We have administered two drachms of the fluid extract of cannabis indica intravenously as the operation is not serious enough to warrant a more intense general anesthesia.

Judging from the character and amount of discharge, as well as absence of tumifaction of the parts, we imagine that the lesion is not serious.

An incision is made on the right side disclosing a small cavity surrounded by firm fibrous tissue from which extending downward and forward is a sinus reaching a depth of two inches behind the cartilage of prolongation. An incision is now made on opposite side to insure drainage. All fibrous material and shreads of necrotic tissue are surgically removed; hemorrhage arrested by ligation or torsion and parts are now quite firmly packed with gauze saturated with tincture of iodin, same retained by two sutures.

After treatment: Gauze is to be removed in thirty-six hours, thereafter parts are to be irrigated daily with a sterilized normal salt solution,

and granulations controlled by frequent application of tincture of iodin, or some more potent astringent. Internally we recommend the administration of polyvalent pyogenic bacterins every fourth or fifth day according to clinical indications.

Prognosis:—Favorable.

Case 3.—Light sorrel gelding. Operation for roarer. Operator, Dr. J. H. Blattenberg, Lima, Ohio.

(The animal was cast in the room, secured and put under general chloroform anesthesia, the throat shaved, washed and tincture of iodin applied.)

Dr. J. H. Blattenberg: Gentlemen, this animal has been roaring for about a year or two. The operation will be the Williams operation for removing the mucous membrane from the ventricle lining behind the arytenoid cartilage and above the vocal cords. I shall insert this burr in order to grasp the mucous membrane or sack before removing it. Under certain circumstances and conditions the operation can be done with the horse standing using a local injection of cocain.

The seat of the operation is about where the angles of the jaw are on a parallel with the larynx. The incision is made about four inches long, longitudinally and must be done without cutting any one of the cartilages or injuring the vocal cords. The left vocal cord seems to have no power within it at all.

The mucous membrane lining the ventricle is removed leaving the ventricle with a raw surface that will draw back the arytenoid cartilage in the process of repair. That is the repair process which Dr. Williams says draws back and holds the vocal cord. I seldom if ever stitch the wound after the mucosa has been taken out. Here of course the animal is on his back, but in proper position there is drainage and the process of healing goes on very nicely by simply keeping the wound clean and not feeding for the first thirty-six hours; thereafter feed off the ground. In a case where there is double removal it sometimes necessitates a tube in the larynx.

Case 4.—Four-months-old colt. Operation for knuckling. Operator, Dr. John W. Adams, Philadelphia, Pennsylvania.*

"After an extremely interesting discourse on the condition and the indications for the operation, its probable results, choice of instruments employed, etc., the colt was secured in hobbles and laid on its side, and tenotomy performed, with result that the little animal put the foot flat on the ground on being released." (A. V. R.)

Case 5.—Bay mare. Roarer. Operators, Dr. W. L. Williams and J. N. Frost, Ithaca, New York.

At this point the following paper was read:

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* Discussion not returned from Operator.

THE SURGICAL RELIEF OF ROARING.

By W. L. Williams and J. N. Frost,

Ithaca, New York.

In 1905 we (W) began a series of investigations having as their final goal the surgical relief of roaring by the denudation of the laryngeal ventricles of their mucosa and in 1906 presented a communication upon our work to that date, before this Association[1]. A second communication was presented at the 1907 meeting and a third at the 1911 convention. These communications review the ground in a manner to answer our needs at this time.

New impetus was given to the investigations when Blattenberg announced at our 1911 meeting that the ventricular mucosa could be readily detached from the subjacent parts by means of an ordinary mastoid drill or burr, which with modifications was introduced to the profession as Blattenberg's burr. The mechanism of this burr opened up interesting new possibilities especially the practicability of operating upon the standing patient.

We were at once confronted with the difficulty and insecurity of keeping the larynx amply dilated with the apparatus in use and began some experiments looking to the construction of an instrument which would be readily applied; would rest securely in place in a standing patient; would secure a maximum dilation of the laryngeal wound and would not interfere with the operative technic. This we have largely attained in the speculum which we use in the operation.

A more serious difficulty soon arose. We found that however careful we might be, we usually perforated the ventricular mucosa with the Blattenberg burr, which meant that the barbs thereon came dangerously near to the perichondrium of the neighboring cartilages.

In other cases the steel burr lacerated the ventricular mucosa extensively and then tore away, necessitating the re-insertion of the burr which now came in immediate contact with the perichondrium and threatened its integrity. These fears were borne out clinically and the injuries were followed by chondritis, necrosis of the cartilages, suppuration and exuberant granulation of connective tissue in the ventricular cavity.

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[1]Proceedings American Veterinary Medical Association, 1906, page 179.

In order to overcome this danger we began a series of experiments by which we hoped to devise a burr or other appliance which would eliminate largely or wholly the dangers of the steel burr without in any way decreasing its efficiency.

After numerous failures we finally had an instrument constructed upon the pattern of the Blattenberg burr, substituting a pure rubber sphere for the steel burr. The soft rubber sphere would not adhere to the ventricular mucosa and our investigations again looked discouraging when we (Frost) found that by the trivial addition of a very thin layer of absorbent cotton, the rubber sphere not only caught the ventricular mucosa, but held it far more firmly than the steel burr. The instrument is entirely too new for the final word to be spoken, but thus far it has given promise of highly satisfactory results. Its advantages are apparently three:

1. It grasps the ventricular mucosa more promptly and securely than the steel burr.

2. It does not tend to lacerate or mutilate the mucosa so that the operator may always assure himself that all the mucosa has been removed.

3. The danger of wounding the perichondrium is obviated.

The general technic of the present operation has already been given in various communications and recently quite fully illustrated in our hand book, "Surgical and Obstetrical Operations," third edition, by W. L. Williams, and it is only necessary to add that in the use of the soft rubber ventricular burr, after applying cocain and adrenalin to the ventricle, that cavity should be wiped dry with a small bit of absorbent cotton, the burr carefully dried, a very thin layer of absorbent cotton securely wound about the rubber sphere, the instrument introduced into the ventricle, turned to the right till the mucosa is firmly engaged, drawing moderately in slightly varying directions upon the instrument until the mucosa inverts and appears outside the mouth of the ventricle when it is to be grasped with a pair of strong forceps and the remainder of the operation carried out as already described in the published technic.

Few operations in the history of veterinary surgery have undergone so rapid development as has that for roaring since our first communication to this society six years ago. During this brief interval the operation has been adopted practically wherever veterinary science is known. At times the development has seemed

entirely too precipitate for safety and, indeed, false issues have arisen and unhealthy excresences have developed, but in spite of this the surgical relief of roaring has hastened forward. The operation is better today than a year ago, with abundant room for further investigations.

In our investigations at the New York State Veterinary College we have considered promptly and carefully every suggestion from whatever source which might contribute anything of value toward the solution of the problem. In our seven years of investigation we have had constantly in view our original purpose of inducing a safe and enduring adhesion of the arytenoid cartilage or cartilages to the thyroid by means of the removal of the ventricular mucosa, thus holding the arytenoid cartilages out of the glottis. We believe the two appliances which we have described, and which will be illustrated clinically during this meeting, constitute a material advancement in the technic of the operation for roaring.

DR. W. L. WILLIAMS: I would like to say, in addition, that for a number of months, in fact for nearly a year, since the introduction of the burr by Blattenberg, we have operated almost wholly on the standing animal but occasionally find an animal so extremely nervous and resistant as to require being thrown. We recently operated upon a lot of seven mules, six of which were cast and turned upon their backs. This is not an operation which lends itself very well to clinical demonstration except to two or three observers, therefore, we will hasten through the operation as promptly as circumstances will permit and if the animal is quiet and comfortable afterwards we will give opportunity for those who so desire to look through the speculum into the larynx.

(Longitudinal incision made with the animal standing in the stall and speculum inserted.)

DR. W. L. WILLIAMS: The patient seems so well on the right side we shall only operate on the left, preferring to operate on one side only, in such cases. Perhaps on a common animal we would operate on both sides to avoid any chances of subsequent roaring on the left side. There is very little bleeding under these conditions as compared with the recumbent position, and you will observe how little physical or nervous strain this operation causes. The danger of casting is entirely obviated and the horse has been hurt less than she would have been by being cast and then having to be let up.

We injected cocain subcutaneously and in the larynx.

Case 6.—Bay stallion with double scrotal hernia. Operators, W. A. Axby and J. W. Blattenberg.

History—very obscure, animal shipped in from northern Indiana for operation. (Cannibis indica, fluid extract, two drachms is given intraven-

ously.) Animal securely confined on the floor of amphitheatre.

W. A. Axby: The field is prepared in accordance with modern antiseptic precautions.

On examination the scrotal region presented a decided indurated condition of both the dartous and subcutaneous structures. An ample incision is made extending down to the tunica vaginalis, which is firmly adherent to the surrounding structure. The tunica is very thin, containing a loop of intestines of considerable length and freed by blunt dissection from surrounding structures up to the internal abdominal ring where an incision through it discloses an atrophied testicle. The hernia is reduced, tunica containing testicle and cord twisted and covered operation is completed.

A ligature of catgut is used passing it through and several times around these structures and then securely tied. Now the dependent parts are removed two inches below the ligature with the emasculator and the wound irrigated with sterile water, dried, packed with bichlorid gauze, the whole retained by two cutaneous sutures.

After proceeding with the same technique on the opposite side the animal is assisted to consciousness by applying to the nostrils aqua ammoniae on a sponge and is helped to his feet in good shape.

After care: Animal to be kept in clean surroundings, prophylactic dose of three-thousand units of antitetanic serum administered. The gauze to be removed in thirty-six hours and thereafter the lips of the wound to be cleansed daily with sterile water. Gentle exercise after the third day is recommended.

Prognosis: Favorable.

Case 7.—Bay gelding. Operation for quittor. Operator, Dr. W. L. Williams, Ithaca, New York.

Dr. W. L. Williams: We have been asked to operate upon this horse for quittor or necrosis of the lateral cartilage. The quittor operation is performed in a great variety of ways, one essential feature being disinfection. As the lateral cartilage is a pure hyaline cartilage, when it once becomes diseased it heals very stubbornly and consequently in cases which have proven refractory to the ordinary methods of handling I prefer to operate by what is known as the Bayer operation.

Fundamentally, of course, the foot needs to be cleaned, pared down and an antiseptic pack placed upon it for twenty-four hours. I assume that you are all familiar with the Bayer operation and also know that there are several types of quittor operation. Each operator has his own method and hence the Bayer's operation is performed with slight differences by each individual.

(The operation was then performed and after its completion the animal was released and walked to its stall without difficulty.)

Dr. W. L. Williams: In removing the horn over the lateral cartilage in this animal the laminae were found very badly diseased and indeed, absolutely destroyed over a large area. The coronary band was also so badly diseased that it had to be cut away in order to get the parts clean and the lateral cartilage was found to have nearly all disappeared on

account of necrosis; one piece, however, of a green color, was lying practically loose, while another piece was necrotic and attached to the connective tissue adjacent to it.

The case gives good promise of a fair recovery, but there will be considerable blemish at the coronary band. The dressing has been applied to prevent the wound from suffering physical injury during the healing period; it is thoroughly covered, packed and on the outside is an impermeable, tarred bandage, so that the horse in stepping into any kind of filth will suffer no harm through infection unless infected matter is dropped down between the bandage and the leg from above. If the horse is comfortable and free from pain the bandage is allowed to remain on for ten or twelve days.

Case 8.—Resection of ligamentum nuchae for poll-evil. Operator, W. A. Axby, Harrison, Ohio.

Horse confined on table and general anesthesia of chloroform administered.

DR. W. A. AXBY: This is a chronic condition observed over fourteen months ago, but no radical operation has thus far been performed.

After proper preparation of the field by shaving, scrubbing and the application of tincture of iodin an incision ten inches in length is made one-half inch from median line on the left side and extending from the occipital crest backward over the cervical region; disclosing the bursae filled with flocculent pus and shreds of degenerating ligament. There is a great amount of fibrous structure which will be removed together with the diseased portion of the ligamentum nuchae by making an initial transverse incision posteriorly and then dissecting it free from its anterior attachment. Drainage will be afforded at the cut end of the ligament by a perpendicular incision; hemorrhage arrested by ligation, torsion or actual cautery and the wound carefully packed with sterile gauze, retained by deep sutures.

After treatment: Gauze to be removed in thirty-six hours and wound daily irrigated with normal salt solution, dried thoroughly and cavity filled with acetanilid or boric acid. Should further necrosis of the ligament appear such portions must be surgically removed and diligent care exercised to insure drainage. The animal to be fed from the ground. Appropriate internal treatment is advised.

Prognosis: Favorable.

Case 9.—Bay stallion. Operation for ridgeling. Operator, Dr. J. H. Blattenberg, Lima, Ohio.

(The animal was cast on the floor of the amphitheatre and bound, the operator making an incision into the abdominal cavity removing the testis without making the hole through abdominal wall much larger than the testis itself; this was accomplished by breaking through with two fingers and getting hold of the epididymis.)

DR. J. H. BLATTENBERG: I have never found the omentum because originally there is no canal for the omentum to get down. I do not break

through except with two fingers and do not allow anything to come out except something relative to the testicle. Following the operation I have the animal tied up for thirty-six hours. If the testicle is fair sized you must necessarily make an opening into abdomen accordingly and have a care not to allow the intestines to come out, often prompted by allowing the animal to lie down. We use no anesthetic but it would be more humane to do so. We consider, however, that the operation is no more severe than ordinary castration.

Case 10. Black mare. Operation of supra-carpal tenotomy. Operator, Dr. L. A. Merillat, Chicago, Illinois.

Dr. L. A. Merillat: The subject here is a five-year-old mare afflicted with "break knees," slightly worse on the off leg but affected on both sides. The condition presented is a joint deformity, a disease belonging to the group of deformities which are of articular origin; the knee being the articulation affected. Yesterday you had the pleasure of witnessing a similar operation by Dr. Adams on a deformation in the plantar region on a very young colt, wherein the disease or pain resulted in a contracture of the sessamoidean ligaments and of the flexor tendons. Here is a similar condition affecting the carpal bones. The pain of synovial or ligamentous inflammation causes the joint here to be held in a state of flexion, and to accommodate the new position the tendinous structure has become shortened.

The one thing to remember in regard to such a deformation is that the tendon is not initially the seat of the disease. I think veterinarians sometimes make mistakes through misinterpreting this condition. The fact that a tendon is shortened is very often thought to be the cause of the deformity, when in reality the tendon is perfectly normal; its structure is absolutely normal; it is only defective in length, and the length has been abbreviated to accommodate itself to the new angle at which the joint was forced by the disease.

On examination of the knee we find here well pronounced carpitis. It is not very difficult to decide that this carpus is affected with an exostosis in the lower row of carpal bones and that the exostosis is responsible for the condition.

The operation we are going to perform to correct this deformity is known as carpal tenotomy. It consists of a division of the tendons, attached to the trapezium; the external, the middle and a part of the internal flexor of the carpus; the muscles which occupy the posterior antibrachial region, which become tendinous about an inch above the trapezium bone and attach themselves to it. If the knee shortens or changes position or flexes through disease, this tendon contracts and holds the knee from falling back into its normal position.

It is important in performing this operation to clean and carefully disinfect the part in order to positively forestall infection. This tenotomy is not such a very easy one to perform because there is no very distinct line of division between the muscles to be cut and those to be avoided, and the superior carpal blood vessels located in this region

sometimes, if there is carelessness in the division, causes a profuse bleeding; moreover, the knife might also be carelessly plunged into the superior sac of the carpal sheath and cause serious synovitis. The sac lies just under the area to be operated on.

An operating table is a much better means of restraint, for any operation that requires pulling on the leg is always difficult on account of the fact that the horse's body will revolve from the traction required to hold the leg in position. A bichlorid pack was applied yesterday to the operative area and aseptic precautions are quite important for we know that it is not possible to avoid interfering somewhat with the venous circulation; that possibly a synovial sac might be wounded and that blood will fill the space between the cut ends.

We are using a weak solution of cocain with a little adrenalin as a combined anesthetic and hemostatic but one cannot very efficaciously cocainize such a field because the incision is through very hard structures and besides it would be impossible to deposit the solution at every point the knife will touch; it is helpful, however, for the cutaneous incision. As Dr. Adams said yesterday the tenotome most desirable in this work has a slightly curved and very short cutting surface, to facilitate cutting off the tendons little by little without enlarging the skin wound, such an instrument I would prefer to this one. It is also very important in this as well as in all tenotomy operations to produce effectual results to have the patient pretty well anesthetized, for if the patient is perfectly quiet there is no interference in the division of the tendon otherwise occasioned by the constant jerking of the leg.

The seat of operation is about an inch above the trapezium. The external tendon attached to the trapezium is the external flexor of the carpus, the large one is the middle flexor; the one on the inside is the internal flexor; they are, of course, closely related in this region and there is no distinct line of demarcation between them to be seen in the living subject, although, of course, easily separable in the dissecting room.

The knife is guided straight forward for a short distance and then directed to the internal face of the leg. When the knife is felt under the skin at the inside of the leg it is turned against the tendon, which is then divided subcutaneously.

If the leg is not yet straightened because we have not touched the external tendon, both sides should be divided without removing the knife unless the horse is not quiet enough to carry out that plan. One must be careful, of course, not to cut deep enough to divide the perforatus.

If one fears the tendons are not entirely cut off, it is important to press the fingers into the space to determine if the skin is compressible all around the field.

(The operation was completed and the horse allowed to stand.)

The after-care of such operation consists largely of putting the leg in some form of brace to keep it straight. In this case the incision in the skin is larger than necessary and is caused by the long blade and the lack of general anesthesia. When the horse first gets up his leg will be straighter than it was before, but if you watch him half an hour afterwards in the stall, you will find it in the old position again on account

of the fact that he finds the most comfort in the flexed position, so in order to complete the work it will be necessary to force the leg into a straight position for a period of three or four weeks by the application of a brace, or a cast. The horse should be given sufficient rest to enable the initial lesion to cure. Blistering and rest in the country at pasture is very desirable.

You will now notice that the leg has taken a pretty normal position. It it a better leg than the opposite one. There would be no harm in operating on two legs at the same operating period if one were sure there would be no complications. If one should get an abscess after the operation on both legs the patient having no leg to support his weight would be in a bad way. A unilateral complication would be less serious.

Case 11.—Black mare. Shortened tendon. Operator, Dr. L. A. Merillat, Chicago, Illinois.

Dr. Merillat explained that this condition was due to inflammation of the carpal joint. The pain of synovial inflammation, or of ligamentous inflammation, had caused the joint to be held in a state of flexion, and to accommodate the new position, the tendinous structure had shortened.

Dr. L. A. Merillat: The operation we are going to perform to correct this condition is known as carpal tenotomy. (Operation proceeded with.) The position is better than the opposite leg, but you will notice half an hour from now, in the stall, that the animal will find the same old position, and the application of a brace will be necessary to effect a cure.

Case 12.—Bay gelding. Operation for roarer. Operator, Dr. L. A. Merillat, Chicago, Illinois.

(The animal was thrown in the ring by English hobbles and chloroformed.)

Dr. L. A. Merillat: Here is a horse that probably will not be cured by this operation. I believe that, judging from the symptoms he displays in his struggles, he is rather more of a roarer from damage to the trachea than from the larynx, and that he will continue to be a roarer. This is more of a clinical case than a practical case. The horse being under general anesthetic we may be able to give you a better exhibition than otherwise.

There is an obstacle in the trachea detected by passing a rubber sound from the laryngeal incision downward to the old scar of the previous tracheotomy. An attempt to remove the obstruction would give one lots of trouble. This horse's breath is fetid, probably from a pulmonary necrosis.

(The operation proceeded according to the Williams method and the mucosa removed by Blattenberg's burr after which the horse was released, the operation being apparently successful.)

Case 13.—Bay gelding. Operation for kick wound on the inner aspect of the tibia. Operator, Dr. W. L. Williams, Ithaca, New York.

DR. W. L. WILLIAMS: This case, as far as we understand its history is the result of a kick wound on the inner aspect of the tibia, and it has been followed by necrosis with a sequestrum of bone imbedded in the tibia. In introducing the probe we touch a diseased bone and, moreover, I find that the fistula, which we saw discharging pus runs over behind the tibia, making it necessary to chisel away a part of the postero-internal border of the bone in order to reach the seat of the trouble. We have packed the wound with iodoform and beyond daily disinfection it will require no special treatment.

Case 14.—Resection of aponeurosis of flexor pedis perforans tendon. Operator, W. A. Axby, Harrison, Ohio.

History and symptoms: Horse picked up a nail eight days previous, followed with excessive lameness. The wound has received ordinary palliative treatment and the general condition of the animal is extremely bad. Temperature 106 degrees Fahrenheit; respiration accelerated with every indication of general septic infection.

Animal is cast after receiving two drachms of the fluid extract of cannabis indica intravenously.

DR. W. A. AXBY: The field must necessarily be scrubbed and cleaned as these important features have until now been overlooked After removing all keratogenous tissue a transverse incision will be made through the frog one inch anterior to the bulb of the heel. (Operation proceeded.) Two incisions are made obliquely forwarded resecting a V shaped portion of the frog and disclosing an advanced state of tissue necrosis of the plantar bursae and aponeurosis. All possible necrotic tissue is removed, parts curetted, irrigated and packed with iodoform with gauze. A dry dressing applied externally consisting of gauze, cotton and oakum and the entire region thoroughly sealed with application of pine tar. After treatment: In anticipation of considerable slough, we deem it advisable to dress the wound daily, as before described. Internal treatment in accordance with symptoms of general infection.

Prognosis: Unfavorable.

Case 15.—Bay mare. Operation ovariotomy. Operator, Dr. H. Fulstow, Norwalk, Ohio.

This was an operation for vaginal ovariotomy on a five-year-old mare with colt, the mare being a nymphomaniac. The animal was high spirited and difficult to control as there were no stocks and she cast herself two or three times. She was eventually controlled and the operation performed satisfactorily.

Case 16.—Bay mare. Operation ovariotomy. Operator, Dr. H. Fulstow, Norwalk, Ohio.

This also was a case of vaginal ovariotomy, this animal being also difficult to control. One ovary was so covered with peritoneum as to make it difficult to unravel. Two drachms of cannabis indica were administered in the jugular vein. The ovaries upon being successfully removed were found to be badly cystic.

Case 17.—Bay gelding. Operation for hydrocele. Operator, George R. White, Nashville, Tennessee.

DR. GEORGE R. WHITE: This horse was sent here for operation for scrotal hernia, but we find that it is nothing more nor less than an ordinary "water sac." It is one of comparative infrequent results of castration of the horse, but it is a very frequent sequel to castration in the mule and on that account I want to say a few words about how to prevent this difficulty in mule castration. The presence of a "water sac" in a mule indicates either ignorance or carelessness on the part of the operator and reflects as much on the veterinarian's ability as any operation he can do. It is absolutely essential that we educate qualified veterinary surgeons to avoid leaving a "water bag" or sac and this is by severing the proper part of the tunica vaginalis. If the mistake is made of severing the cord in this location invariably will form a "water bag" in the mule. Always sever the cord in mule castration an inch or an inch and a half above the tunica vaginalis.

The tincture of iodin is an ideal skin disinfectant for this as for other operations and it should be used more often than it is. Some surgeons in removing hydrocele make an eliptical incision but I find a straight incision is about all that is usually necessary. More or less adhesions are always present as they seem to be the natural consequence of the hydrocele.

Case 18.—Light sorrel gelding. Operation for quittor. Operator, Dr. R. C. Moore, of Kansas City, Missouri, assistant, Dr. G. H. Roberts, of Indianapolis, Indiana.

This operation, an advanced case of quittor, was performed on an operating table in the smaller operating room of the college, the animal having been given two drachms of cannabis indica in the jugular vein shortly before the operation. It was found that the hoof had grown up under the coronary band and the bone ossified, requiring curettement. Two incisions for drainage were made and the operation performed successfully. The animal afterwards was led to the stall in apparent comfort.

Case 19.—Bay gelding. Operation for roaring. Operator, Dr. J. N. Frost, Ithaca, New York.

It was at first intended to operate on the horse standing in the stall but the animal proved too excitable and was cast upon the floor of the amphitheatre.

The William's method was followed and the operation did not differ from previous operations for roaring performed during the clinic.

Case 20.—Bay mule. Operation arthritis. Operator, Dr. W. J. McKinney, Brooklyn, New York.

This was a simple operation for arthritis in the shoulder joint performed by puncturing to the condyle of the humerus. Drainage was established and the enlargement successfully reduced.

Case 21.—Bay mule. Operation removal of fibroid tumor. Operator, Dr. George R. White, Nashville, Tennessee.

This was an operation for removal of an immense fibroid tumor and sac on the neck of an aged mule, situated above the anterior aspect of the sternum.

The animal was placed on the operating table two and a half drachms of cannabis indica injected into the jugular vein. Two lateral incisions were made close to the base of the tumor, its adhesions were severed and the tumor which weighed close to twenty pounds was successfully removed, the wound packed, dressed and sutured, but the animal died from surgical shock before regaining his feet, this being the only death in the operating room during the entire course of the clinic of three or four days. The immense size and location of the tumor together with the advanced age and physically weakened condition of the mule were contributing factors to shock and death in this case.

Case 22.—Heifer. Ovariotomy. Operator, Dr. John W. Jameson, of Paris, Kentucky.

This was a simple flank operation for ovariotomy in a heifer in calf and called for no special comment.

Case 23.—Heifer. Operation ovariotomy. Operator, Dr. Manly, Dayton, Ohio.

This, also, was a simple case of ovariotomy performed on a heifer, the only item of interest being the demonstration of the X-stitch by Dr. J. W. Klotz.

Case 24.—Bay gelding. Operation handling of float. Operator, Dr. C. C. Brown, Memphis, Tennessee.

This was a demonstration of the handling of the float in the mouth of a horse tied in the stall.

A split molar tooth was discovered on the right side projecting out into the mouth. A light pair of forceps were used to take out the piece and the doctor suspicioned that the animal had been injured some time on the inside of the face.

Dr. Brown rarely ever uses a speculum except where the animal has a very bad tooth to extract and then it is indicated in order to keep from injuring the gum when the forceps are set as sometimes happens.

Operation proceeded with and demonstration successful.

Case 25.—Dapple gray gelding. Roarer. Operator, Dr. John W. Adams.

A tracheotomy tube had been inserted to this horse's trachea about two weeks previously. Horse was cast and chloroform administered, and the roaring operation performed.

Case 26.—Bay gelding. Operation median neurectomy. Operator, Dr. J. W. Klotz, Noblesville, Indiana.

This was an operation consisting of removing a section of the median nerve for lameness in the carpel joint, a simple operation, taking but a few minutes and was performed successfully.

Case 27.—Bay gelding. Operation for fistula on the poll. Operator, Dr. J. H. Blattenberg.

This operation was performed with the horse standing on the floor of the amphitheatre, an incision being made and drainage provided for.

The abscess was deep-seated and along the superior part of the neck in the median line. There was a large amount of inspissated pus, which was drained with difficulty after which peroxide was applied, the wound packed with sterilized gauze and sutured. The operator recommended that the operation be followed up by use of bacterin treatment.

Case 28.—Bay mule. Operation for hernia. Operator, Dr. J. H. Blattenberg.

The animal was cast on the floor of the amphitheatre. There were a number of adhesions which were successfully removed and the operation performed without comment.

There were a number of other simple operations such as equine dental operations, ovariotomy of cows, horses and bitches, these called for no remarks. In all there were fifty-six operations performed at the clinic, and it is believed to have been the largest clinic ever held by veterinary surgeons in the United States.

SOCIAL FEATURES AT INDIANAPOLIS.

For the entertainment of the members, their wives and friends attending the forty-ninth annual convention which was held at Indianapolis, the Local Committee on Arrangements of the American Veterinary Medical Association provided many pleasing events; the program being ample and well chosen.

Whenever the opportunity presented itself the visitors were entertained by some proceedings not on the regular program, as was the case when a member of the Citizen's Committee discovered that visitors and delegates who had arrived on Sunday were having some difficulty in trying to be comfortable in the warm hotel lobby. Accommodations for all were quickly arranged on the roof garden of the Columbia Club where refreshments were served and a most enjoyable evening spent.

After a day of sightseeing and renewal of old acquaintances, the visitors were pleasingly entertained during Monday evening at the Claypool Hotel where Dr. D. E. Salmon gave an illustrated lecture on "Uruguay." Dr. Salmon is always welcomed as an entertainer and lecturer by the members of the veterinary profession, and his talk on this topic was not only instructive but also abounded in humor.

On Tuesday morning President Brenton called the convention to order and the assembled delegates, members, friends and ladies filling the large convention hall of the German house were entertainingly welcomed to the city of Indianapolis by his Honor ex-Mayor, Charles A. Bookwalter. At the close of this hearty welcome Dr. J. G. Rutherford responded acknowledgement of the greeting on behalf of the members and following the convention began the strenuous labors of the annual meetings while the ladies were entertained unceasingly by the Local Committee.

The general reception to visitors was given Tuesday evening at the Claypool Hotel and members of the entertainment committee took advantage of the occasion to see that visitors from all sections of the country became acquainted. Luncheon was served and later in the evening the Montani Orchestra lured all to the ball room floor.

An opportunity of "Seeing Indianapolis" was given the visiting ladies on Wednesday morning. About forty automobiles were provided for a trip passing through the beautiful residence sections, proving to the visitors that Indianapolis is essentially a "city of homes," and through the parks of the city, which are the most extensive in the middle west. The ride along the boulevards was completed when the machines drew up in front of the Hume-Mansur Building about noon for a luncheon, which was served upon the roof garden.

One of the most entertaining affairs for the visiting ladies was the card party given by the Indianapolis ladies in the parlors of the Claypool Hotel on Wednesday evening. This very delightful evening was spent while the gentlemen were enjoying a smoker and vaudeville at the German House. The vaudeville entertainment was "made to order" and was given by a company from a local theater. Most of the puns and jokes were at the expense of the officers of the Association and members of the Local Committee. Some of the songs were aimed at the veterinarian, depicting his failures and successes in fulfilling the duties of his profession.

As the Automobile Speedway offers one of the attractions to outsiders who come to Indianapolis, the ladies were scheduled for a trip to the noted place on Thursday morning. The course of the speedway is two and one-half miles around and paved entirely with brick. Several racing machines with their daring drivers were on the track affording an opportunity to see a demonstration of the excessive speed that can be obtained on this course.

The annual banquet was held on Thursday evening, more than two hundred and fifty guests being in attendance. The German House, noted for its original German dishes and old vintage, was the place chosen for this occasion. The toastmaster of the evening, Dr. John W. Adams, of Philadelphia, kept the assembly in the best of humor by his many appropriate tales. Dr. N. S. Mayo replied to the first toast, "To the Ladies," in words fitted to the occasion as only a gentleman from Virginia could reply. Dr. W. H. Dalrymple of Louisiana and Dr. R. A. Archibald of California, replied to toasts, "From the South" and "From the West," respectively. "The land of the Maple" was not to be overlooked and Dr. E. A. A. Grange of Toronto, Canada, and Dr. J. E. Rutherford of Calgary, were called upon for

their messages from the Dominion. Both speakers pictured their native land in glowing terms. Between the various toasts the orchestra enlivened the occasion and altogether the 1912 banquet will be one to be remembered by all who were present. (G. H. R.)

REGISTRATION AT THE FORTY-NINTH CONVENTION, INDIANAPOLIS, INDIANA, 1912.

MEMBERS.

ALABAMA.—C. A. Cary.

ARKANSAS.—R. R. Dinwiddie.

CALIFORNIA.—R. A. Archibald, D. F. Fox, C. Keane.

CANADA.—

ALBERTA.—J. C. Hargrave, Robert Riddell, J. G. Rutherford.

MANITOBA.—C. D. McGilvary, W. A. Hilliard, J. A. Stevenson.

NEW BRUNSWICK.—D. McCuaig.

ONTARIO.—J. D. Ross, T. Thacker, F. Torrance, C. H. Higgins, E. A. Watson, E. A. A. Grange.

COLORADO.—G. H. Glover, I. E. Newsom.

DISTRICT OF COLUMBIA.—A. M. Farrington, J. R. Mohler, D. E. Salmon.

GEORGIA.—W. M. Burson, T. E. Jago.

IDAHO.—J. H. Weber.

ILLINOIS.—A. H. Baker, D. M. Campbell, O. E. Dyson, T. J. Foster, W. Fraser, C. Frazier, B. F. Hudson, Joseph Hughes, J. Hutchison, G. B. Jones, R. A. Luzader, G. B. McKillip, A. M. Mair, L. B. Micheal, J. T. Nattress, James Robertson, J. F. Ryan, A. W. Smith, N. I. Stringer, A. M. Wray.

INDIANA.—C. B. Ainsworth, J. F. Allen, F. W. Anderman, W. J. Armour, J. L. Axby, F. A. Bolser, O. L. Boor, E. M. Bronson, G. W. Butler, C. V. Connell, R. A. Craig, W. B Craig, D. A. Davison, G. G. Ferling, C. I. Fleming, H. H. George, J. O. Greeson, R. L. Hanna, J. P. Hart, J. L. Hidley, A. V. Johnson, S. G. C. Kelly, J. W. Klotz, W. H. G. Lampe, F. E. Lawton, W. Langtry, F. C. McCoy, A. L. Marvel, F. A. Mueller, G. B. Munger, W. F. Myers Jr., O. C. Newgent, S. V. Ramsey, W. W. Renter, G. H. Roberts, J. C. Rodger, T. A. Sigler, E. J. Tansey, M. S. Weigel, R. B. Whitesell, O. G. Whitestine.

IOWA.—H. A. Alcorn, G. Lames, J. H. McLead, G. A. Scott, C. H. Stange, W. C. Stewart.

KANSAS.—G. F. Babb, L. W. Goss, K. W. Stouder.

KENTUCKY.—Robert Graham, Alex. Harthill, G. P. Isbell, J. W. Jameson, L. M. Land, C. A. Miller, R. P. Moody, H. O. Moon.

LOUISIANA.—W. H. Dalyrymple.

MAINE.—W. H. Robinson.

MARYLAND.—Wm. Dougherty, E. H. Riley.

MASSACHUSETTS.—Francis Abele, Jr., W. M. Simpson, J. F. Winchester.

MICHIGAN.—J. Black, S. Brenton, C. C. Dauber, J. S. Donald, G. W. Dunphy, Thos. Farmer, W. I. Francoise, G. D. Gibson, W. Giltner, J. J. Joy, R. P. Lyman, J. M. Miller, H. L. Schuh, H. E. States.

MINNESOTA.—R. I. Coffeen, H. Preston Hoskins, G. Ed. Leech, C. C. Lipp, S. H. Ward, M. H. Reynolds, J. Spencer.

MISSISSIPPI.—E. M. Ranck.

MISSOURI.—J. W. Connaway, H. Jensen, A. T. Kinsley, J. V. Lacriox, R. C. Moore, B. W. Murphy, C. J. Sihler, S. Stewart, S. L. Stewart.

MONTANA.—M. E. Knowles, W. J. Taylor.

NEBRASKA.—J. S. Anderson, A. Bostrum, Paul Juckniess.

NEVADA.—W. B. Mack

NEW JERSEY.—J. T. Glennon, Jas. McDonough, W. Runge, T. E. Smith.

NEW YORK.—E. B. Ackerman, G. H. Berns, S. H. Burnett, D. W. Cochran, J. F. DeVine, R. W. Ellis, Otto Faust, P. A. Fish, H. D. Gill, W. H. Hollingworth, F. Hunt, W. H. Kelly, R. S. MacKellar, W. J. McKinney, H. J. Milks, V. A. Moore, C. D. Pearce, G. T. Stone, W. L. Williams, J. G. Wills.

NORTH CAROLINA.—W. H. Chrisman, A. C. Jones, G. A. Roberts, W. A. Sullivan.

NORTH DAKOTA.—E. D. Harris.

OHIO.—W. A. Axby, F. E. Anderson, J. H. Blattenberg, G. W. Cliffe, L. P. Cook, A. S. Cooley, A. E. Cunningham, B. H. Edgington, J. D. Fair, H. Fulstow, A. D. Gemmill, D. C. Hanawalt, R. C. Hill, R. Hilty, W. C. Holden, J. H. Jefferson, A. J. Kline, J. C. Meyers, H. T. Moss, W. H. Redhead, W. Shaw, E. H. Shepard, W. B. Washburn, D. S. White, H. Worcester.

OREGON.—J. F. Morel.

PENNSYLVANIA.—J. W. Adams, E. P. Althouse, W. J. Cant, D. B. Fitzpatrick, C. M. Hoskins, W. H. Hoskins, J. Helmer, R. L. Kann, L. A. Klein, F. E. Lentz, F. H. McCarthy, D. McKibbin, C. J. Marshall, W. H. Mattson, K. F. Meyer, H. F. Palmer, W. H. Paxton, E. C. Porter, J. Reichel, W. H. Ridge, F. H. Schneider, B. F. Senseman C. W. Springer, W. E. Wight.

SOUTH DAKOTA.—J. L. Barber, E. A. McCain.

TENNESSEE.—C. J. Becker, T. Butler, R. F. Eagle, M. Jacob, G. R. White.

TEXAS.—J. E. Wilkins.

VIRGINIA.—R. R. Clark, N. S. Mayo, S. C. Neff, G. A. Revercomb.

WASHINGTON.—S. B. Nelson, J. T. Seeley.

WEST VIRGINIA.—H. B. Langdon.

WISCONSIN.—A. C. Belnke, M. W. Brach, B. L. Clarke, O. A. Eliason, F. B. Hadley, R. S. Heer, J. F. Roub. (Total 349.)

VISITORS.

CANADA.—

NEW BRUNSWICK.—J. McCuaig.

ONTARIO.—T. Gladwin, C. A. Hodgett, M. D., J. B. Hollingsworth.

ILLINOIS.—Franklin Adams, I. S. Alford, L. H. Allen, G. G. Baker, W. F. Christensen, H. Christman, C. C. Clark, S. W. Clark, J. E. Davis, C. E. Dille, J. Dodson, C. C. Donaldson, E. D. Douglas, J. J. Ferguson, R. P. Francis, I. P. Frost, R. Gysel, G. D. Grogan, R. O. Hughes, E. F.

Kuykendell, B. L. Lake, R. C. Lee, C. E. Lucas, C. R. McCoppin, J. G. McKippin, D. W. Marks, W. J. Martin, W. R. Micheal, W. J. Morgan, T. E. Palmer, H. P. Rasmussen, H. C. Rinehart, R. S. Saxton, F. C. Shake, C. P. Shaughnessy, J. C. Stewart, W. G. Teckenbrock, J. P. Triry, M. Vanderkack, H. M. Wakeland, W. H. Weathers, D. V. Winemiller.

INDIANA.—O. Airhart, H. H. Albershardt, E. V. Alexander, G. R. Allen, R. C. Applegate, L. Arganbright, U. G. Ballard, R. Bannister, R. Benjamin, G. E. Bodkin, H. W. Bolser, P. A. Bonebrake, C. F. Bintrayer, V. V. Botkin, D. A. Bowen, S. E. Bowman, F. Braginton, B. H. Branson, F. O. Bray, F. W. Bratton, H. E. Bricker, S. L. Britton, C. E. Brood, R. Brown, V. H. Brown, F. H. Brown, D. K. Buzzard, D. A. Call, J. R. Campbell, O. B. Campbell, R. W. Carmack, J. R. Carson, A. B. Carter, J. E. Carrico, C. M. Catey, G. W. Cayle, C. W. Clark, J. R. Clark, W. O. Conner, Ed. Cooper, J. Cox, A. G. Cox, E. T. Davis, D. A. Dawson, W. H. Dean, L. DeMott, C. C. Dodson, A. R. Dougherty, T. E. Dougherty, J. A. Dragoo, W. C. Edwards, J. C. Elberson, J. T. Ellis, F. J. Erdell, G. C. Eurick, O. T. Eurick, A. T. Ferguson, L. C. Finley, G. C. Foster, W. S. Fowler, A. D. Galbraith, T. A. Gentle, H. J. Gray, O. D. Grawcock, F. W. Graves, G. R. Graves, G. E. Griffin, L. A. Griner, A. H. Gruner, W. L. Hadley, T. M. Hall, G W. Hamilton, M. H. Hamilton, R. F. Harper, G. P. Hartman, S. E. Hayes, J. B. Heaton, J. G. Heighway, B. C. Helms, J. J. Herron, B. S. Hess, C. S. Hess, C. B. Hiatt, O. W. Hiner, C. E. Hoflich, S. Hoover, C. T. Howard, C. J. Hufty, F. A. Hugins, J. F. Hyde, E. A. Jenkins, J. Jennings, A. L. Johnson, F. R. Jones, O. L. Jones, C. A. Joyce, R. C. Julien, F. M. Keanes, C. L. Kegin, C. P. Keine, T. E. Kigan, J. B. Kingery, H. I. Kingery, W. L. Kinsey, J. C. Laidlow, W. H. Lane, E. E. Lang, B. H. Largent, M. Lauther, H. Lett, P. S. Lindley, E. E. Loller, T. B. Lowe, J. C. McDaniel, D. McDonald, C. C. McIntosh, J. D. McLeay, M. D., B. F. Mauok, Wm. Marquette, T. J. Martin, H. A. Miller, J. H. Mills, O. F. Mingle, C. E. Morris, S. W. Morrow, O. A. Nelson, L. E. Northrup, F. B. Norton, W. D. Nottingham, B. C. Ornbaun, C. R. Osborn, W. J. Parker, F. L. Parse, H. Peilemeier, S. C. Phillips, T. W. Potts, C. W. Power, J. E. Pritchard, O. E. Ragsdale, D. A. Ralston, W. R. Ramsey, T. Rawley, L. A. Ray, J. T. Redman, P. H. Rreidel, D. C. Reece, J. S. Reno, George M. Reynolds, P. H. Riechel, J. C. Risher, G. A. Rogers, J. J. Rogers, C. E. Rose, S. I. Rosenberger, J. A. Schwartz, M. W. Scott, I. F. Scripture, P. M. Self, J. J. Sharp, W. N. Sharp, M. M. Shaw, B. O. Sherrill, W. W. Shortle, C. C. Shuler, F. W. Silberg, L. E. Slober, D. E. Smyer, D. C. Smith, G. A. Smith, R. E. Smith, F. W. Smith, S. M. Springer, C. F. Startle, C. H. Steerhoof, A. H. Stewart, J. D. Stum, J. C. Swan, E. C. Test, R. A. Thomas, D. L. Travis, H. W. Turner, W. B. Wallace, T. A. Walsh, H. H. Ward, H. G. White, R. A. Whiting, C. P. Wilson, C. C. Winegarden, W. B. Wise, O. Wolfe, R. E. Wood, D. M. Woollen, W. O. Wyant.

IOWA.—I. W. Edwards, H. B. Freeman, G. G. Graham, H. J. Hagerty, H. S. Murphy, J. H. Weibel.

KANSAS.—B. H. Hanneman.

KENTUCKY.—L. H. Crisler, O. S. Crisler, J. H. Ditto, S. F. Musselman, O. J. Phelps, M. A. Purdy, F. H. Rister, C. E. Stockton, C. J. Warner, D. E. Westmoreland.

LOUISIANA.—Hamblet Moore.

MARYLAND.—Dr. Largent.

MASSACHUSETTS.—W. J. Hennessey.

MICHIGAN.—G. B. Cash, L. L. Conkey, A. Elzinger, N. S. Ferry, M. D., G. G. Graham, Jos. Hawkins, O. J. Howard, S. Irwin, C. C. Mix, E. E. Patterson, A. B. Sexsmith, C. C. Slaght, F. N. Steele, C. A. Waldron, R. H. Wilson.

MISSISSIPPI.—G. W. Neff.

MISSOURI.—F. W. Caldwell, H. L. Dwyer, C. D. Miller.

MONTANA.—J. A. Peed.

NEW JERSEY.—T. B. Rogers.

NEW YORK.—C. H. Duncan, M. D., F. S. Jones, Capt. William F. Kirchner,.

NORTH CAROLINA.—F. S. Charles.

OHIO.—A. S. Alkire, E. H. Alspaugh, J. F. Barnes, H. P. Basinger, H. B. Bopp, J. E. Brownlee, F. R. Butz, C. H. Case, G. H. Chandler, W. E. Clemons, E. H. Collander, E. M. DeTray, M. H. Donce, E. J. Drake, J. E. Foster, B. W. Groff, W. F. Guard, J. C. Hunt, C. E. Inskeep, H. N. Jeffries, F. A. Lambert, C. D. McCormack, H. M. Manley, H. E. Meyers, F. Miller, H. W. Miller, E. W. Probel, J. E. Stansbury, A. B. Scott, F. F. Sheets, E. R. Stockwell, E. C. Sunbaugh, J. E. Turner, W. F. Wise.

OKLAHOMA.—C. C. Hooker.

PENNSYLVANIA.—L. A. Berkley, E. E. Bittles, J. J. Kehoe, J. Eyman, T. F. Nugent, H. F. Pegan, N. Rectenwald, F. N. Sherrick, H. W. Turner.

TENNESSEE.—C. C. Brown, B. F. Morey.

TEXAS.—H. E. Barnes, F. G. Cook.

VIRGINIA.—Thos. Fraser.

WEST VIRGINIA.—J. J. Comwell, William Cross, F. E. Gore, S. E. Hershey, E. L. Layne.

WISCONSIN.—J. Alston, H. D. Pattison.

WYOMING.—Daniel LeMay. (Total 340.)

LADY VISITORS.

ARKANSAS.—Mrs. R. R. Dinwiddie, Mrs. C. E. Rhodes.

CANADA.—Mrs. C. H. Higgins, Mrs. Thacker.

DISTRICT OF COLUMBIA.—Miss Maude E. Donaldson.

ILLINOIS.—Mrs. A. H. Baker, Mrs. G. S. Baker, Mrs. C. F. Behner, Mrs. Ira Dodson, Mrs. S. Faney, Miss Josephine K. Hughes, Mrs. Joseph Hughes, Mrs. E. A. McKoppin, Mrs. L. A. Merillat, Miss Rose Murphy, Miss Myrtle Pray, Mrs. H. P. Rasmussen, Mrs. F. F. Ryan, Mrs. W. E. Sayer, Mrs. A. M. Wray.

INDIANA.—Mrs. Otis Airhart, Mrs. J. B. Archer, Mrs. W. J. Armour, Mrs. J. L. Axby, Mrs. W. A. Axby, Mrs. E. Bauer, Mrs. F. A. Bolser, Mrs. I. J. Bolton, Mrs. O. L. Boor, Mrs. T. H. Brown, Miss Bush, Mrs.

E. D. Bushnell, Mrs. R. W. Carmack, Mrs. Jos. Carr, Mrs. A. B. Carter, Mrs. Zetta Clark, Mrs. Edw. Cooper, Mrs. R. A. Craig, Mrs. D. A. Davison, Mrs. Martha Deinatt, Mrs. A. L. Ferguson, Mrs. Ferling, Misses Ferling, Mrs. C. J. Ferling, Mrs. Guy Foster, Miss Ruth Fuller, Mrs. A. Hamilton, Mrs. J. P. Hartman, Mrs. B. S. Hess, Mrs. O. H. Hiner, Miss Esther Hiner, Mrs. F. A. Hugins, Miss Florence Huten, Mrs. V. A. Johnson, Miss Rosa Jones, Mrs. C. P. Kine, Miss Kine, Mrs. J. W. Klotz, Miss Agnes Klotz, Mrs. Guy Lampe, Mrs. W. H. Lampe, Mrs. E. E. Lang, Miss Mary Lawton, Miss Ruth Lawton, Mrs. B. F. Long, Miss Bernice Luther, Mrs. F. C. McCoy, Mrs. Dea McDonald, Mrs. J. D. McLeay, Mrs. J. M. McPhail, Mrs. Ben Manch, Mrs. Wm. Marquette, Mrs. A. L. Marvel, Mrs. S. M. Miller, Mrs. J. H. Mills, Mrs. C. E. Morris, Mrs. O. A. Nelson, Mrs. Nelson, Mrs. Otis Newgent, Mrs. Grace Otto, Mrs. C. R. Osborn, Mrs. F. L. Parse, Mrs. C. W. Power, Mrs. Louisa Riedel, Mrs. Ona Reiber, Mrs. Grace Roberts, Mrs. T. N. Rush, Mrs. B. O. Sherrill, Miss Mollie Schudel, Mrs. Schwartz, Mrs. W. M. Scott, Mrs. Lena Shutte, Mrs. A. W. Smith, Mrs. E. J. Tansey, Mrs. W. B. Wallace, Mrs. May Weigel, Mrs. H. G. White, Mrs. A. G. Whitestine, Mrs. C. P. Wilson, Miss May D. Wilson, Mrs. D. M. Woollen, Miss Wright.

IOWA.—Mrs. I. W. Edwards.

KANSAS.—Mrs. G. F. Babb, Mrs. Walter Frazer.

KENTUCKY.—Mrs. R. P. Moody, Mrs. C. J. Warner.

MARYLAND.—Mrs. Largent, Mrs. T. J. Quinn.

MICHIGAN.—Miss Mary Bostetter, Mrs. S. Brenton, Miss Opal Conkey, Mrs. J. S. Donald, Mrs. Dunphy, Mrs. M. E. Elzinger, Mrs. E. E. Patterson, Mrs. A. B. Sexsmith.

MINNESOTA.—Mrs. G. Ed. Leech.

MISSOURI.—Mrs. A. T. Kinsley, Mrs. G. B. Munger, Mrs. S. Stewart.

MONTANA.—Mrs. M. E. Knowles.

NEW YORK.—Mrs. E. B. Ackerman, Mrs. David Cochran, Miss Cochran, Mrs. R. W. Ellis, Mrs. H. D. Gill, Mrs. Frank Hunt, Mrs. Helen V. Powderly, Mrs. L. R. Weber, Mrs. W. L. Williams.

NORTH CAROLINA.—Mrs. G. H. Roberts.

NORTH DAKOTA.—Mrs. L. Van Es.

OHIO.—Mrs. A. S. Alkin, Mrs. George Buck, Mrs. G. H. Chandler, Mrs. E. H. Callander, Mrs. A. S. Cooley, Mrs. E. M. DeTray, Mrs. B. H. Edgington, Mrs. B. W. Groff, Mrs. R. C. Hill, Miss Mary Hill, Mrs. A. J. Kline, Mrs. C. D. McCormack, Mrs. W. Shaw, Mrs. Wm. F. Wise, Mrs. L. M. Worcester.

PENNSYLVANIA.—Mrs. J. O. Eyman, Miss Anita Fitzpatrick, Mrs. Jacob Helmer, Mrs. W. H. Hoskins, Mrs. C. J. Marshall, Mrs. W. H. Mattson, Miss Ella T. Ridge, Mrs. Frederick Schneider, Miss Frances Schneider, Mrs. Mary Sherrick, Mrs. Wight.

TENNESSEE.—Mrs. C. C. Brown, Mrs. Tait Butler, Mrs. M. Jacob.

UTAH.—Miss Fern Cook.

WASHINGTON.—Mrs. S. B. Nelson.

WISCONSIN.—Mrs. B. L. Clark, Mrs. H. T. Eckhert, Mrs. R. S. Heer.

MEETINGS.

1863. FIRST MEETING, New York, N. Y., June 9 and 10.
1864. Semiannual (comitia minora)—New York, N. Y., January 19.
Annual—New York, N. Y., September 6.
1865. Semiannual—New York, N. Y., March 7.
Annual—Boston, Mass., September 5.
1866. Semiannual—New York, N. Y., March 5 and 6.
Annual—New York, N. Y., September 4.
1867. Semiannual—Boston, Mass., March 5.
Annual—New York, N. Y., September 3.
1868. Semiannual—New York, N. Y., March 5.
Annual—Boston, Mass., September 1.
1869. Semiannual—Boston, Mass., March 16.
Annual—New York, N. Y., September 21.
1870. Semiannual—Philadelphia, Pa., March 15 (no quorum).
Annual—New York, N. Y., September 20.
1871. Semiannual—Boston, Mass., March 21.
Annual—New York, N. Y., September 19.
1872. Semiannual—Boston, Mass., March 16.
Annual—New York, N. Y., September 17.
1873. Semiannual—Boston, Mass., March 17.
Annual—New York, N. Y., September 16.
1874. Semiannual—Boston, Mass., March 17.
Annual—Not held, owing to error in date of notices sent out.
1875. Semiannual—Boston, Mass., March 25.
Annual—New York, N. Y., September 21.
1876. Semiannual—Boston, Mass., March 21.
Annual—New York, N. Y., September 10.
1877. Semiannual—Boston, Mass., March 20.
Annual—New York, N. Y., September 18.
1878. Semiannual—Boston, Mass., March 19.
Annual—New York, N. Y., September 17.
1879. Semiannual—Boston, Mass., March 18.
Annual—New York, N. Y., September 16.
1880. Semiannual—Boston, Mass., March 16.
Annual—New York, N. Y., September 1.
1881. Semiannual—Boston, Mass., March 13.
Annual—New York, N. Y., September 20.
1882. Semiannual—Boston, Mass., March 21.
Annual—New York, N. Y., September 19.
1883. Semiannual—Boston, Mass., March 20.
Annual—New York, N. Y., September 18.
1884. Semiannual—Boston, Mass., March 18.
Annual—Cincinnati, Ohio, September 16.

1885. Semiannual—Boston, Mass., March 17.
Annual—New York, N. Y., December 15.
1886. Semiannual—Boston, Mass. No legal meeting held (no quorum).
Annual—New York, N. Y., September 21.
1887. Semiannual—Philadelphia, Pa., March 15.
Annual—New York, N. Y., September 20.
1888. Semiannual—Baltimore, Md., March 20.
Annual—New York, N. Y., September 18.
1889. Semiannual—Boston, Mass., March 19.
Annual—Brooklyn, N. Y., September 17.
1890. Chicago, Ill., September 16 and 17.
1891. Washington, D. C., September 15 and 16.
1892. Boston, Mass., September 20, 21 and 22.
1893. Chicago, Ill., October 17, 18, 19 and 20.
1894. Philadelphia Pa., September 18, 19 and 20.
1895. Des Moines, Iowa, September 10, 11 and 12.
1896. Buffalo, N. Y., September 1, 2 and 3.
1897. Nashville Tenn., September 7, 8 and 9.
1898. Omaha, Neb., September 6, 7 and 8.
1899. New York, N. Y., September 5, 6 and 7.
1900. Detroit, Mich., September 4, 5 and 6.
1901. Atlantic City, N. J., September 3, 4 and 5.
1902. Minneapolis, Minn., September 2, 3 and 4.
1903. Ottawa, Canada, September 1, 2, 3 and 4.
1904. St. Louis, Mo., August 16, 17, 18 and 19.
1905. Cleveland, Ohio, August 15, 16, 17 and 18.
1906. New Haven, Conn., August 21, 22, 23 and 24.
1907. Kansas City, Mo., September 10, 11, 12 and 13.
1908. Philadelphia, Pa., September 8, 9, 10 and 11.
1909. Chicago, Ill., September 7, 8, 9 and 10.
1910. San Francisco, Cal., September 6, 7, 8 and 9.
1911. Toronto, Canada, August 21, 22, 23 and 24.
1912. Indianapolis Indiana, August 27, 28, 29 and 30.

PRESIDENTS.

1863-64.	J. H. Stickney, Massachusetts.
1864-65.	A. S. Copeman, New York.
1865-66.	C. M. Wood, Massachusetts.
1866-67.	R. H. Curtis, New York.
1867-69.	R. Wood, Massachusetts.
1869-71.	E. F. Thayer, Massachusetts.
1871-75.	A. Large, New York.
1875-77.	A. Liautard, New York.
1877-79.	C. P. Lyman, Massachusetts.
1879-81.	J. L. Robertson, New York.
1881-83.	W. Bryden, Massachusetts.
1883-85.	W. B. E. Miller, New Jersey.
1885-86.	L. McLean, New York.
1886-87.	A. Liautard, New York.
1887-89.	R. S. Huidekoper, Pennsylvania.
1889-90.	C. B. Michener, New York.
1890-92.	R. S. Huidekoper, Pennsylvania.
1892-93.	W. L. Williams, Indiana.
1893-96.	W. Horace Hoskins, Pennsylvania.
1896-97.	F. H. Osgood, Massachusetts.
1897-98.	D. E. Salmon, District of Columbia.
1898-99.	A. W. Clement, Maryland.
1899-1900.	Leonard Pearson, Pennsylvania.
1900-1901.	Tait Butler, Indiana.
1901-1902.	J. F. Winchester, Massachusetts.
1902-1903.	S. Stewart, Missouri.
1903-1904.	R. R. Bell, New York.
1904-1905.	M. E. Knowles, Montana.
1905-1906.	W. H. Lowe, New Jersey.
1906-1907.	James Law, New York.
1907-1908.	W. H. Dalrymple, Louisiana.
1908-1909.	J. G. Rutherford, Ontario, Can.
1909-1910.	A. D. Melvin, District of Columbia.
1910-1911.	G. H. Glover, Colorado.
1911-1912.	S. Brenton, Michigan.
1912-1913.	J. R. Mohler, District of Columbia.

SECRETARIES.

1863.	A. Liautard, New York.
1864.	R. Jennings, New Jersey.
1865-1867.	C. Burden, New York.
1867-1869.	J. F. Budd, New York.
1869-1874.	J. L. Robertson, New York.
1874-1877.	J. D. Hopkins, New Jersey.
1877-1880.	A. A. Holcombe, New York.
1880-1888.	C. B. Michener, New York.
1888-1893.	W. Horace Hoskins, Pennsylvania.
1893-1894.	T. J. Turner, Missouri.
1894-1895.	Leonard Pearson, Pennsylvania.
1895-1902.	S. Stewart, Kansas and Missouri.
1902-1906.	John J. Repp, Iowa and Pennsylvania.
1906-1910.	Richard P. Lyman, Connecticut and Missouri.
1910-1913.	C. J. Marshall, Pennsylvania.

OFFICERS, 1912-1913.

President.

JOHN R. MOHLER, Washington, D. C.

First Vice-President.

G. H. ROBERTS, Indianapolis, Ind.

Second Vice-President.

JOHN W. ADAMS, Philadelphia, Pa.

Third Vice-President.

H. JENSEN, Kansas City, Mo.

Fourth Vice-President.

C. E. COTTON, Minneapolis, Minn.

Fifth Vice-President.

V. A. MOORE, Ithaca, N. Y.

Secretary.

C. J. MARSHALL, Philadelphia, Pa.

Treasurer.

GEORGE R. WHITE, Nashville, Tenn.

Librarian.

S. H. BURNETT, Ithaca, N. Y.

COMMITTEES, 1912-1913.

Executive.

A. D. Melvin, *Chairman*,

Sesco Stewart, F. Torrance,
Joseph Hughes, Harry D. Gill,
David F. Fox.

Intelligence and Education.

E. A. A. Grange, *Chairman*,

Pierre A. Fish, W. B. Craig,
C. H. Stange, R. A. Archibald.

Diseases.

V. A. Moore, *Chairman*,

L. Van Es, K. F. Meyer,
A. T. Kinsley, C. M. Haring.

Legislation.

W. Horace Hoskins, *Chairman*,

W. G. Hollingworth, James Robertson,
John P. Turner, F. A. Bolser.

Finance.

Thomas A. Sigler, *Chairman*,

H. Preston Hoskins, A. S. Cooley.

Publication.

Richard P. Lyman, *Chairman*,

R. W. Ellis, J. H. Blattenberg,
C. J. Marshall, Ward Giltner.

Necrology.

Orville L. Boor, *Chairman*,

S. Brenton, A. H. Baker,
J. G. Wills, A. Bostrom.

Resolutions.

W. H. Dalrymple, *Chairman*,

E. H. Shepard, S. H. Ward,
George A. Johnson, George B. McKillip.

SPECIAL COMMITTEES, 1912-1913.

International Tuberculosis Commission.

J. G. Rutherford, *Chairman*,

Veranus A. Moore, J. W. Flavelle,
John R. Hurty, W. D. Hoard,
John R. Mohler, W. C. Edwards,
J. J. Ferguson, Frederick Torrance,
E. C. Schroeder, C. A. Hodgetts,
T. W. Tomlinson, Mazyck P. Ravenel.

M. H. Reynolds, *Secretary*,

Revision of Veterinary Anatomical Nomenclature.

S. Sisson, *Chairman.*

I. E. Newsom, S. L. Stewart.

Veterinary College Investigation.

M. H. Reynolds, *Chairman,*

George W. Dunphy, P. H. Browning.

Agriculture College Investigation.

A. M. Farrington, *Chairman,*

Paul Fischer, James B. Paige.

Advertisements of Veterinary Remedies.

N. S. Mayo, *Chairman,*

C. A. Cary, S. B. Nelson.

Reorganization of Association.

D. E. Salmon, *Chairman,*

D. M. Campbell, George H. Hart,
James Law, C. J. Marshall.

For the Detection of Glanders.

E. B. Ackerman, *Chairman,*

Adolph Eichhorn. Charles Keane,
Charles E. Cotton, John Reichel.

Committee on Fiftieth Anniversary Celebration.

A. Liautard, *Chairman,*

W. Horace Hoskins, *Acting Chairman,*

J. F. Winchester, C. E. Clayton,
Harry D. Gill. D. W. Cochran,
George H. Berns, Thomas E. Smith,
E. B. Ackerman, R. H. Kingston,
R. W. Ellis, J. B. Hopper,
W. L. Williams, Thomas Bland,
James Robertson, W. G. Hollingworth,
W. Reid Blair, J. E. Ryder,
W. J. Coates, William Dougherty.

RESIDENT SECRETARIES, 1912-1913.

UNITED STATES.

Alabama—C. A. Cary, Auburn.
Arizona—J. C. Norton, Phoenix.
Arkansas—J. F. Stanford, Fayetteville.
California—David F. Fox, Sacramento.
Colorado—I. E. Newsom.
Connecticut—G. W. Loveland, Torrington.
Delaware—H. P. Eves, Wilmington.
District of Columbia—R. W. Hickman, Washington.
Florida—Thomas J. Mahaffey, Jacksonville.
Georgia—William M. Burson, Athens.
Hawaii—Victor A. Norgaärd, Honolulu.
Idaho—G. E. Noble, Boise City.
Illinois—L. A. Merillat, Chicago.
Indiana—J. W. Klotz, Noblesville.
Iowa—William W. Dimock, Ames.
Kansas—Kirk W. Stouder, Manhattan.
Kentucky—L. M. Land, Lexington.
Louisiana—E. A. White, New Orleans.
Maine—A. Joly, Waterville.
Maryland—Frank H. Mackie, Baltimore.
Massachusetts—Francis Abele, Jr., Quincy.
Michigan—James J. Joy, Detroit.
Minnesota—G. E. Leech, Winona.
Mississippi—E. M. Ranck, Agricultural College.
Missouri—F. F. Brown, Kansas City.
Montana—A. H. Cheney, Miles City.
Nebraska—Paul Juckniess, Lincoln.
Nevada—W. B. Mack, Reno.
New Hampshire—F. S. Allen, Nashua.
New Jersey—J. Payne Lowe, Passaic.
New Mexico—Marion Imes, Albuquerque.
New York—John F. DeVine, Goshen.
North Carolina—Wm. G. Chrisman, Raleigh.
North Dakota—W. F. Crewe, Devil's Lake.
Ohio—J. D. Fair, Millersburg.
Oklahoma—Charles H. Jewell, Fort Sill.
Oregon—W. Dean Wright, Portland.
Pennsylvania—F. H. Schneider, Philadelphia.
Philippine Islands—A. R. Ward, Manila.
Porto Rico—T. A. Allen, San Juan.
Rhode Island—John S. Pollard, Providence.

South Carolina—Enoch Barnett, Clemson College.
South Dakota—Stanley W. Allen, Watertown.
Tennessee—M. Jacob, Knoxville.
Texas—R. P. Marsteller, College Station.
Utah—H. J. Frederick, Logan.
Vermont—F. A. Rich, Burlington.
Virginia—George C. Faville, Norfolk.
Washington—J. T. Seeley, Seattle.
West Virginia—L. N. Reefer, Wheeling.
Wisconsin—W. G. Clark, Marinette.
Wyoming—Otto L. Prien, Laramie.

CANADA.

Alberta—Edward A. Watson, Lithbridge.
British Columbia—Seymour Hadwen, Agassiz.
Manitoba—C. D. McGilvray, Winnipeg.
New Brunswick—D. McQuaig, McAdam Junction.
Nova Scotia—William Jakeman, Glace Bay.
Ontario—D. McAlpine, Brockville.
Prince Edward Island—W. H. Pethick, Charlottetown.
Quebec—M. C. Baker, Montreal.
Saskatchewan—D. S. Tamblyn, Regina.

AUSTRALIA.

Australia—J. Desmond, Adelaide.

SOUTH AMERICA.

Brazil—John H. McNeil, Sao Paulo.

Authorized Appendix to 49th Annual Report.

MINUTES OF THE ASSOCIATION OF VETERINARY FACULTIES AND EXAMINING BOARDS OF NORTH AMERICA HELD AT INDIANAPOLIS, INDIANA, 1912.

OFFICERS.

President,
DR. SESCO STEWART, Kansas City, Missouri.

First Vice-President,
DR. E. L. QUITMAN, Chicago, Illinois.

Second Vice-President,
DR. WM. H. RIDGE, Trevose, Pennsylvania.

Secretary-Treasurer.
DR. S. B. NELSON, Pullman, Washington.

MONDAY MORNING,
August 26, 1912.

The annual meeting of the Association of Veterinary Faculties and Examining Boards of North America was held in the Claypool Hotel, Indianapolis, Indiana, on Monday, August 26, 1912, the proceedings being opened at 10:00 a. m., in the Palm Room of the hotel, by the President, Dr. S. Stewart, of Kansas City Missouri, there being a good attendance of members present.

THE PRESIDENT: Gentlemen, I declare the Association of Veterinary Faculties and Examining Boards of North America in session. The program as arranged by the Secretary calls for the reading of the minutes of the last meeting.

DR. A. H. BAKER (Chicago, Ill.): Mr. President, in view of the fact that these minutes have been printed, I move that the reading of them be dispensed with. Seconded. (Carried.)

DR. S. B. NELSON (Spokane, Wash.): Mr. President, I move that the minutes as printed in the report of the American Veterinary Medical Association of 1911 be approved. Seconded. (Carried.)

THE PRESIDENT: The schedule next calls for an address by the President. Now addresses by the chair oftentimes are perfunctory. They take various phases of expression. What little is said here, and it will be but little, is in the hope that we may continue the growth we have already accomplished. We are rather loosely knit together as an organization and as our coherence is so uncertain I believe we should take steps to make it more substantial. We sustain a questionable relationship with the American Veterinary Medical Association. Men ask, what is the relationship? No one, however, is quite able to tell, other than that we are, as it were, a stepson, an allied organization, loosely allied. We may become more closely allied if we wish to. The remarks that I offer will not apply to that phase of the subject, but, rather, how we may become more efficient as a body; how we may continue to accomplish something definite.

PRESIDENT STEWART'S ADDRESS.

Gentlemen, Members of the Association of Veterinary Faculties and State Examining Boards of North America:

The records of the last meeting of this Association, published in the report of the American Veterinary Medical Association, meeting 1911, is a highly creditable showing for earnestness of purpose, zeal for the cause, and breadth of view looking toward the ideals we are holding for the veterinary profession. The ten papers presented clearly indicate that we are carefully analyzing our present status and paving the way of progress which is bound to be the outcome of the activities of this body. Candor, sincerity and earnestness of purpose as well as a broad fraternal spirit marked our sessions and bespeaks the certainty of professional uplift through our efforts.

Among the things accomplished during the last session was the specific expression of our approval of the adoption of a uniform degree, namely: "Doctor of Veterinary Medicine"; second —our approval of the revision of veterinary anatomical nomenclature, and providing for appointment of a revision committee; third—a positive expression, in the form of resolutions, for higher matriculation requirement for admission to veterinary colleges and for a longer course of instruction, fixing a date when such requirements should become operative.

Professional ethics received earnest attention but no positive action was taken. This problem should be given further consideration during this meeting. The subject is a very important one and is giving the profession much concern. It is a live theme

in the various state and local associations and touches vitally interstate and international veterinary sanitary service. A number of state associations in the central west have adopted strong resolutions condemning negligence, dishonesty and perfidy on the part of many practitioners and some officials, which is evidenced by fraudulent certificates of health, given of animals for sale or for interstate and international traffic. These resolutions offer moral and financial support to the responsible officers for the punishment of offenders, and urge examining boards, if within their power, to revoke the licenses to practice of those found guilty. Such drastic punishment seemingly will be required to purge the profession of its irresponsibles, and to deter the thoughtless and avaricious.

If state boards having the power will exercise it in one or two cases, and give wide publicity to their acts, the number of offenses will soon be markedly diminished. There is every reason to believe that a knowledge of such effort will lead legislators to amend the practice acts by giving this power in states where the law governing veterinary practice does not make the necessary provision. In Iowa and Missouri the state veterinary associations have acknowledged their earnest support to their state examining boards and state sanitary officers, in any efforts they may put forth to estop the professional offenders, and thus remove the stigma of corrupt veterinary practice in their respective states. The combined efforts of the bodies before mentioned will soon bring about a much higher degree of public confidence in the veterinary profession. I suggest that plans be made here and now whereby all the states may be interested in this movement and thus enable our profession to everywhere secure that public confidence in its integrity and ability which must obtain if our profession shall perform that large public service which it alone is prepared to render.

If this body would create a committee and provide it with sufficient funds there is no doubt that it could accomplish more by a campaign of education through publicity of specific cases of revocation of license to practice, than is likely to be accomplished in many years, though desultory and individual state efforts. If we could place in the hands of every licensed practitioner a brief statement of the facts and the punishment of violators in all the states represented in this organization, the veterinary public conscience would soon be aroused, the thoughtless and indif-

ferent would awake to the gravity of negligence or dishonesty in the issuing of health certificates and this evil would be soon largely corrected.

The title of this Association would indicate that college faculties and veterinary examining boards generally participated in the doings of this organization. It is gratifying to observe that nearly all of the college faculties have been represented at recent meetings, but it is deplorable also to note the lack of participation on the part of veterinary examining boards. The failure of veterinary examining boards to become actively identified in the work of this association is due doubtless to several causes. Investigation leads me to believe that the principal one is the absence of any provision, in the laws creating the several examining boards, for authority to appropriate funds necessary to cover the expenses of representation. This difficulty can be bridged over, until the laws can be amended, through the assistance of state veterinary associations. I happened to know that some state associations have already become interested in this matter and have offered to provide the necessary funds, and have asked their state boards to send representatives to this meeting. If we could find a way to have some additional reports of our meeting bound separate from the report of the American Veterinary Medical Association and to place a copy of same in the hands of all members of the various examining boards also the secretaries of the various state veterinary associations, in cases where such secretaries and members of examining boards are not members of the American Veterinary Medical Association, doubtless we would interest them in the work of this Association and secure their active membership and cooperation hereafter. We should do something to enlist them in the great work before us and I submit this plan for your earnest consideration.

Much was said last year relative to the necessity of more thorough training in the colleges of those who are applicants for license to practice. It was suggested strongly that the colleges should modify their methods of teaching in many ways, more particularly with the view of preparing their students for competent state and inter-state sanitary service. It was broadly hinted that the division of instruction, involving ethics (public morality) needed a larger measure of attention. These points were urged by members engaged in sanitary service and members of examining boards. That portion of the membership of this

body which is particulary related to colleges or engaged in college work is very much interested in such expressions from those who are charged with the responsibility of determining the fitness of veterinary graduates for license to practice, and for public service. The colleges need the assistance of these official boards to guide them aright in the preparation of young men to enter the profession.

If examining boards shall do their full part in the advancement of veterinary education they will not lightly perform their public functions but will consider their obligations to the public, and will so prepare themselves that they may conduct their examinations in such a broad and substantial manner that their certificates shall represent merit and be a true sign of the worthiness and capability of the holders of such licenses. While we know that political influence determines appointments in many states, we must trust professional pride to lead members of examining boards to look fully into the problems before them and to take advantage of the experiences of their predecessors in their own and other states. When they do this then state examinations will mean something. They will impress upon the colleges the need of exercising a closer discrimination as to what is taught and how, to maintain a closer surveillance of the work of the students, and to know with a greater certainty the preparedness of candidates before conferring diplomas.

It is entirely within its field for this association to discuss the scope and methods of examination by state examining boards; for it to consider the ways and means by which examiners may be fully informed as to what is being done in other states; also what is being taught in the colleges. A discussion of these subjects in an open and fraternal spirit will lead to more uniform and representative examinations and pave the way to state reciprocity in license to practice.

As stated before the colleges may be greatly strengthened by intelligent state board examinations and we believe that state boards may be assisted in many ways by the colleges. It is perfectly legitimate for state boards to call upon colleges for specific information as to the character and extent of instruction given therein, also as to their methods of teaching and the requirements made upon students in order that they may be considered proficient. If the state boards will exercise this privilege and the

colleges honestly and faithfully cooperate there can be no question as to the progress we will make in veterinary education.

Let us get closer together in our efforts then our progress will become more positive and the end sought be more quickly reached.

THE PRESIDENT: The next in order is the report of the Secretary.

THE SECRETARY (Dr. S. B. Nelson): Mr. President, the minutes of the last meeting were gotten together and sent to the Committee on Publication of the American Veterinary Medical Association to be edited and printed. The membership was increased to forty members last year and your Secretary wrote, at the suggestion of the President, to each veterinary college in America and also to every state board asking for a paper for this meeting. The responses were not as plentiful as they should have been. Later in the season the Secretary wrote to a number of men whom he thought should be on the program and through this method the program was prepared.

The expenses of the Association have been kept within the receipts, so that we have a small amount on the right side of the ledger as may be observed by the following:

RECEIPTS.

Cash on hand	$15.02	
Collected during year	40.00	
		$55.02

EXPENDITURES.

Stenographer at Toronto	$37.19	
Telegraphing and postage	10.00	
Printing 1912 program	6.25	53.44
Balance on hand		$1.58

THE PRESIDENT: Gentlemen you have heard the report of the Secretary. What is your pleasure?

DR. A. H. BAKER: Mr. President, I move it be accepted. Seconded. (Carried.)

THE PRESIDENT: Gentlemen, do we wish to have a Committee on Resolutions so that we may express our doings in such a tangible way that the American Veterinary Medical Association may take cognizance of them?

DR. GEORGE H. GLOVER (Fort Collins, Colo.): I move, Mr. President, that a committee of three on resolutions be appointed to report to the American Veterinary Medical Association.

The motion was duly seconded and carried.

DR. C. J. MARSHALL (Philadelphia, Pa.): Mr. President, I think this report should be presented Wednesday afternoon at two o'clock. That session of the American Veterinary Medical Association is to be given over to consider any recommendations that may emanate from this body.

Dr. W. Horace Hoskins (Philadelphia, Pa.): I move that the committee be instructed to report to the American Veterinary Medical Association on Wednesday afternoon. Seconded. (Carried.)

Dr. W. Horace Hoskins: Mr. President, I would like to present to this association a copy of the original constitution and by-laws of this association, as arranged in 1894, to go into the archives of the association. It was adopted at Philadelphia, and I found it among some old papers. (Applause.)

The President: This paper is of historic moment and I will receive it in the name of the association, and commit it to the care of the Secretary with instructions that he file it with the other papers of the association.

The minutes show that, last year, provision was made for the appointment of a committee on constitution and by-laws. The committee was named and subsequently reported. The Secretary tells me that he, being a member of the Executive Committee of the American Veterinary Medical Association, was out when this report was made and he is not aware of what became of the report, or the nature of that report. I fear that whatever was done has been in vain. If we wish to become a solidly organized body it will be necessary to have a working basis and it would be wise to make provision for a new committee on constitution and by-laws.

Dr. C. J. Marshall: I do not know as it is the proper time to present it, but I think that possibly this body should be organized as a section of the American Veterinary Medical Association. We have three sections this year. If this comes about it might make a little difference in the wording of the revised constitution and by-laws, that might be adopted by that association.

The President: In reply to Dr. Marshall's remarks, members of the state examining boards, and the members of college faculties are not all affiliated with the American Veterinary Medical Association. There is a conflict. Only members of that association can participate logically in their section work. There are those connected with colleges and those on examining boards who, we fear, would hesitate to accept any invitation, feeling that they were really outside the pale of the American Veterinary Medical Association. That is one of the facts that has kept us an allied organization. The state of Texas has a state board of examiners consisting of seven, if I remember right, and of those only two or three are members of the American Veterinary Medical Association. One is an applicant for membership this year. That puts us in rather an uncomfortable position in trying to make this a section of that body.

Dr. W. Horace Hoskins: We cannot be a distinct section in the sense that others are a distinct section of the American Veterinary Medical Association. I take it that that condition will remain for a long time, that appointments will be made in states, from time to time, of men, who are eligible under the laws to appointment but who are not eligible for membership in the American Veterinary Medical Association.

Dr. Marshall: I think there is no difficulty in organizing ourselves to become a section because some are members of a faculty or state board

and not members of the American Veterinary Medical Association. Some of them are not members of this Association and I have never seen them attend our meetings or take part in the discussion. This organization is quite a nonentity; we do not know what it is. We do not know this year even if we should write up the report. Has not the time come when this body should be organized properly as a section?

Dr. A. T. Kinsley (Kansas City, Mo.): Mr. President, Dr. Marshall's idea seems to me to be a good one. I do not see why the discussions and papers presented here should not be included as a sectional report of the American Veterinary Medical Association,—as a section on intelligence and education. We practically cover the same ground. This association, as has already been stated, is somewhat of a nonentity; it does not seem to have any particular place. I do not see any reason why our work could not be performed under the section of intelligence and education.

Dr. C. H. Higgins (Ottawa, Can.): I am in favor, Mr. President, of the suggestion of Dr. Marshall. I made some remarks on this same basis last year, that there should be a coordinated effort to strengthen the American Veterinary Medical Association as much as possible. If we start a number of other organizations we take interest away from the parent organization. I know there was a discussion last year as to another feature of the work, a work that was purely laboratory. There was a movement on foot to establish a special organization for laboratory workers who are interested in the problems of sanitary science and police. We decided, however, to allow this proposal to go over before anything was finally done. Some laboratory papers have been brought into the special sessions of the American Veterinary Medical Association, and while the conditions are not, perhaps, quite what we would wish, at the present time, we have started in the right direction to avoid building up another organization which would meet either before or after the American Veterinary Medical Association.

I think the more coordinated effort we have the stronger the parent organization will be and the stronger the various sections will be. If members of examining boards are not eligible I think it would be along the line of improvement in educational methods if we raise them up to the higher plane. We cannot take everybody in from the outside but if we set a higher plane for them to rise to will they not eventually rise to it?

The President: The problem has been before us many, many times. I do not know how many of you have interviewed members of state examining boards, who are not members of the parent association as to why they did not attend the meetings of this organization. Theoretically we believe they should be assisted to become members of this organization and become members of the American Veterinary Medical Association, but the general educational problem has been before them all the time. Let me explain. If a man is a graduate of a veterinary college which at one time existed in Des Moines and who today is a member of some state examining board and you extend to him an invitation to participate in the section work of the American Veterinary Medical Association he

says: "I am not a member and cannot become a member under the present regulations; I have no place there at all; would not feel at home and do not believe I shall take the trouble or incure the expense to go, because I am not of that institution in any sense." That is only expressing the feeling of a man, not the members of this organization. Some have it in their minds that we are a stuck-up lot and do not recognize common men. While I agree with Dr. Marshall and Dr. Higgins that it is very desirable that this body be made, a coherent part of the American Veterinary Medical Association.

DR. HIGGINS: I think that is in the direct line of progress and that would enable us to overcome the difficulties that at the present time seem insurmountable. We in Canada look at things differently from what you do in the States. With the exception of one or two provinces we have no practice acts to administer discipline to any members of the profession as you do in the States. There are some things in Canada which require improvement, but I believe provision for associate membership in the proposed section would overcome all difficulty and enable us to build up a greater and stronger organization.

DR. W. HORACE HOSKINS: If there is provided some form of associated membership, we may meet the situation. One of the organizers of this association, one of the most active members in its early history, who was the head of the United States College of Veterinary Surgeons, was and is now debarred from membership in the American Veterinary Medical Association. Dr. Robinson attended for many years and took active part in the work of this organization. He can still attend, the school can still be represented, and has been from time to time, but both he and the members and graduates of his institution are debarred today from membership in the American Veterinary Medical Association. Associate membership could take care of those members who cannot now join the parent body.

DR. JOSEPH HUGHES (Chicago, Ill.): I suggest that we do not adjourn this year without acting very definitely on this question. This Association has a local habitation and name and that is all. It is a regular Ishmealite. It is a singular thing that we should drift along year after year in this way. I do not know why we cannot arrive at some definite conclusion relative to affiliation with the American Veterinary Medical Association.

DR. A. T. KINSLEY: To bring this to a focus, Mr. President, I move that the resolutions committee that has been appointed to confer with or make recommendations to the American Veterinary Medical Association be instructed to ask that body to take this body over and make it a section to be known as the Section on Intelligence and Education.

DR. W. HORACE HOSKINS: That will require a change in the constitution and by-laws of the American Veterinary Medical Association.

DR. HIGGINS: I second the motion.

DR. LOUIS P. COOK (Cincinnati, Ohio): Mr. President, it seems to me that the association of veterinary faculties and examining boards of North America should remain an independent organization or body, and not become a part of the American Veterinary Medical Association. Now it has been brought up here that a great many members of examining boards

are not eligible and would not be eligible to membership in a section of the other association. I do not believe we ought to discard the name we have used for many years and make it a section of the American Veterinary Medical Association. It should remain independent and it would do better work by so remaining. If you make this a section you are going to debar from our membership a great many persons who might help us in good work.

DR. HARRY D. GILL (New York, N. Y.): Mr. President, I have heard only two good things about continuing this organization, one was from my friend Dr. Cook that there was a possibility if we continue along lines as we have heretofore that we would have a goodly attendance. Now it seems to me that falls flat because we have had, from past experience, the present condition of this organization. Dr. Stewart says, that for the reasons he gave, some of the members of examining boards would not be received well by the American Veterinary Medical Association. It seems to me it would be an imposition on our hospitality if that were so. Any one who feels that they would not be received well by the larger association is misinformed. I cannot for the life of me see why we could not become a part of the American Veterinary Medical Association, even without a change of their constitution, which would be necessary if we had associate members. We have in the different sections non-members reading papers and they certainly have no compunction about coming to the Association. They have no fear of not being received well. It seems to me that this association could be absorbed with dignity and it would become a better association. Certainly we would be under a better executive discipline if nothing more and we would accomplish more. I cannot see why Dr. Cook believes that if this association continues as it is it would create anything except discord.

THE PRESIDENT: The motion was that the Committee on Resolutions should draft a resolution recommending that this organization be made a section of the American Veterinary Medical Association and entitled a Section on Intelligence and Education.

The motion was then put to the meeting and carried.

THE PRESIDENT: At this point I am ready to make appointment of the committee on resolutions and you will take note of what has been said. I appoint as the Committee on Resolutions Dr. C. H. Stange of Ames, Iowa, Dr. Joseph Hughes of Chicago and Dr. E. J. Drake of Toledo, Washington.

We have a Committee on Nomenclature. Dr. S. L. Stewart of that committee, is present and is now called on for the committee report.

DR. S. L. STEWART (Kansas City, Mo.): I have been asked to read the report to the American Veterinary Medical Association, and desire to know if it would be a good idea to read it here and then through recommendation by this body to the American Veterinary Medical Association.

THE PRESIDENT: Dr. Stewart, I will explain that this committee of the American Veterinary Medical Association was also appointed a committee of this particular body, and I trust that it feels as though it would like to report at this time. I hope that the report will be such that it can be approved and that this association can give its support to the com-

mittee in whatever it shall recommend to the American Veterinary Medical Association. (The report of the Committee on Veterinary Anatomic Nomenclature was then read and is found in full on page 186 of the Reports of Officers and Committees.)

THE PRESIDENT: Gentlemen, you have heard the report of the Committee on Nomenclature. What is your pleasure?

DR. I. E. NEWSOM: Mr. President, I move the adoption of the report. Seconded by Dr. A. H. Baker.

THE PRESIDENT: It has been moved and seconded that we adopt the report of this committee. Are you ready for the question? This is a body which is as widely interested in the report as anybody can be; it represents the teachers of anatomy and also represents examining boards. This is worthy of debate unless you are of the opinion that the committee has solved this to your liking. Are there any remarks?

DR. HANS JENSEN (Kansas City, Mo.): Does the motion mean that the examiners of the various state boards should exclude all nomenclature except this? If a man of mature years who has been taught the old anatomical terms should not be able to use some of the new names what would be our attitude? Does that motion mean that all the old terms will be excluded and not recognized by examining boards any more?

THE PRESIDENT: Not necessarily.

DR. JENSEN: Then that is all right.

DR. S. HADWEN (British Columbia, Can.): Mr. President, would this be looked upon as the International Code?

THE PRESIDENT: If this body shall approve this report and the American Veterinary Medical Association shall adopt it, then I suspect foreign bodies would necessarily take cognizance of it as representing American thought on this subject.

DR. HOSKINS: Do I understand the state boards must take cognizance of it?

THE PRESIDENT: No.

DR. HIGGINS: Last year that was discussed and the idea was to follow as near as possible the International Code.

THE PRESIDENT: As I understand, this follows the International Code as far as it seems practical, in the minds of the committee. Any further discussion of this report?

DR. GLOVER: Mr. President, I will state that this matter of uniform nomenclature originated with Dr. Newsom of Colorado, in the resolution before this association a year ago, and a committee was appointed. Now then, the status of the matter is this: Shall we be satisfied with simply the preliminary report of the committee, or do we want to recommend to the American Veterinary Medical Association that this committee continue its work and that money be appropriated for this work? It is going to take a little money to carry it on, and I would like to see the endorsement of this Association and also that an appropriation of money by the larger association be made to continue this good work.

DR. JOSEPH HUGHES: I do not know, looking into the future, what will be the outcome of this change in nomenclature. Will it be that it will restrict in the schools the use of the various text books

on anatomy that are at present in existence? We have, I believe, about four that are being used. The most modern system and probably the most complete is Chauveau's. There are four text books in use: Sisson's; Chauveau's; McFadyean's; and Strangeways'. Now those books have all of them good features. All of them are filled with blunders. Are we going to have those blunders perpetuated? What assurance have we that those blunders will be corrected? Are we going to adopt a certain nomenclature to the exclusion of other text books, considering that all the others have points that are of the utmost value, and descriptions which are correct. A book with new nomenclature may have incorrect descriptions. Shall we rely on a revision or a new edition of all the books? Are we going to restrict it to one book? That is what I want to know. It looks to me as though there might be the possibility of a little trust. I would like to be able to select and instruct my students to read certain descriptions and passages from one book, and others from another. I do that. I think I am competent to tell them which is the most correct, and it seems to me a most extraordinary thing that our latest book is filled with common, ordinary anatomical blunders and incorrect descriptions. What assurance have we that these will be corrected?

Mr. Newsom (Fort Collins, Colo.) In answer to Dr. Hughes I would say that I expected some such suggestion as this. I want to say that Dr. Sisson is not the man who originated this idea. If he had been there might be some reason to believe that he possibly wanted his book on the market and no others. This was not originated by Dr. Sisson, although he is chairman of the committee as probably the man best fitted in the United States to handle the subject. Furthermore, this proposition does not confine itself to any one book. When this nomenclature has been adopted there is no reason in the world why there should not be a revision of Strangeways's and McFadyean's, and any other book; there is no reason why they should not contain this standard nomenclature. We all agree these book's need revision and would be better for revision and new editions should be gotten out, and if they adopt this nomenclature they would be on exactly the same plane as Dr. Sisson's book. In fact, in my own mind, I am doubtful if we should adopt the nomenclature in Dr. Sisson's book. He, himself, in the preface says that it is only in the transitional stage. That makes this standard nomenclature necessary. We have McFadyean's, Strangeways's and others, and they are all different. Now we have Dr. Sisson's statement, on the first page of his book, that it is new, and that it is transitional. We don't want to have a new nomenclature this year and next year learn another, and the next year another, and so on. We want to adopt a standard nomenclature, not a new one, necessarily. We want to adopt a standard nomenclature so that those who are familiar with anatomic terms will be able to recognize those terms. It is simply a selection of what we consider the best terms now in use, in almost every instance. I believe that answers Dr. Hughes.

Dr. C. A. Cary: I would just like to say one word about this standard proposition, Mr. President. The American Medical Association have adopted the I. N. A. (International Nomenclature of Anatomy) and the British have adopted the B. N. A. It does not mean there can be no

other change. If there is anything new in the standards there must be a change as the gentleman has said. I do not see any reason why that cannot be done. There are all the reasons in the world why we should have a standard system.

THE PRESIDENT: I want to say to those who are not teaching anatomy that it seems to me that not alone are they vitally interested in this matter. The man who teaches physiology, and the man who teaches surgery must find, as time goes on, that he must revise his nomenclature because the anatomic problems reach out through all of their work. We are all interested and should discuss it fully.

DR. JOHN W. ADAMS (Philadelphia, Pa.): I am not a teacher of anatomy, Mr. President, but I have a subject that is rather closely allied to it, and that is surgery. As I understand it the recommendation of the committee is in accord with the International Code and that the International Association of Anatomists are in accord with it. That to my mind makes it incumbent that we should seriously consider what the International Committee has considered best, and that we should get busy. We have always used in the University of Pennsylvania, Chauveau's Anatomy, realizing, as time went on, its imperfections. When Dr. Sisson, in his new book, recommended the nomenclature as agreed upon by the International Committee of Anatomists I thought it was a good thing; our anatomists in the school thought it was a good thing and that it was a great task for a man who was familiar with one nomenclature to attempt to teach a new nomenclature. But after two years we are not teaching the old names of the carpal bone; the pisiform bone; the pyramidal; the semilunar and the scaphoid. The original meaning of those terms applied to the smaller bones or corresponding bones in the human wrist, were descriptive of the object and uses of those bones in the human wrist, but they are not applicable to the bones in the carcass of the horse and the dog. The incoming student learning his anatomy for the first time can learn the new nomenclature easily. The hardship falls chiefly on the professor of anatomy. Those who learned a nomenclature in past years cannot learn any other, and need not bother themselves with it. It is not a problem at all with me, but it is a question whether we will teach our incoming students what the international body has considered to be the best nomenclature or not.

DR. JOSEPH HUGHES: Mr. President and gentlemen: I do not want to be understood for a moment as saying that I have any objection to the new nomenclature. I have gone over this ground with Dr. Newsom and fully agree with every feature and every point. As far as it being a hardship on the teacher I think it is just as simple for the teacher to take the new nomenclature as it is to take the old. I absolutely endorse it. The only objection, as I said, is that the possible restriction of a school to a single work might be harmful.

DR. S. L. STEWART: I happen to know that some of the publishers, who are publishing veterinary works, have been searching for some one to revise the veterinary anatomies and to adopt in those books the new nomenclature. They have been searching for the last eighteen months

that I know of personally. They are anvious to get their books on the market with the new nomenclature.

Dr. Murphy, (Ames, Iowa): Mr. President, there are one or two things brought out in this discussion I wish to comment on. One of them is in regard to the number of blunders in Sisson's book on anatomy. It is a well known fact that the first edition of any book is full of errors. I have first-hand knowledge that the second edition of this book, which will be before the public within two years, will eliminate a large number of the common errors. It is a large work for one man to edit a book like anatomy, let alone when a considerable portion of it is original. Another thing is that the anatomists, as well as the surgeons, and teachers of medicine, frequently wish to refer to foreign literature, and if we do not have uniform nomenclature there is difficulty as to the foreign literature, particularly the German literature. Another problem is the fact that the new nomenclature has been practically adopted in all sections of this country by professors of biology. We get it in general biology as well as general anatomy. If we should hold to the old nomenclature we must learn the new, for biologists teach us the new nomenclature. In consideration of those two things it seems to me it would be much easier for students to learn the new nomenclature, whether it is easier for the instructor or not, of course, is not of primary consideration.

Dr. L. P. Cook: Mr. President, I for my part do not see the necessity of making any change. Anatomy is an exceedingly simple subject to begin with. It does not make any difference what we call any given part of the body. A man may know anatomy very well and understand every particle and section of the body, and know exactly what it looks like, its form and everything else, and yet not know the name of it. It is not a difficult subject. Why not let the students get all of it; not one name but get Strangeways' and the rest of them? It would not hurt any of them to know two or three names for a single part. As to its creating confusion, some men know a part of the body by one name and never will be able to get that name out of mind or learn a new one. We never will get all the names, there are some millions of parts, and some of them have three, four or five names. Why not? I, for my part, do not see any need for the change. Let it be as it is.

Dr. R. R. Clark (Hampton, Va.): Mr. President, our state board this year, had applications from a hundred students coming from three different sections. We had to use a dictionary to mark their papers correctly. I should be glad to have some uniform system by which we can take one book and assume it is going to be applicable in marking all papers.

Dr. M. P. Smith (Washington, D. C.): I think that it is absolutely necessary to have some uniform nomenclature, particularly, as Dr. Hughes has said, that at the present time we have four or five text-books on the subject and all of them varying in nomenclature. Dr. Hughes may ask a question and expect one answer, and Dr. Cook may ask the same question and expect another answer in reference to the same subject. When students go before state boards all the members of the board are graduates of prior years and it is necessary for such men to use discre-

tion and allow an answer from any one of the four text-books. I think the adoption of a standard nomenclature would in time do away with all of that. Some people would have to learn a new nomenclature and that is difficult but he should help the student all he can.

DR. W. H. RIDGE (Trevose, Pa.): Mr. President and fellow members, I believe that we can adopt a common nomenclature from all the text-books, not picking out any special book. It is the proper thing to do, so that men coming from the different schools have a common knowledge and will be able to put their answers to questions on paper from one text-book which will be adopted and used by all colleges. They may use all the references they want to. In a short time, I believe, all the text-books will adopt one common nomenclature.

DR. W. HORACE HOSKINS: I think we are in duty bound to approve of any movement that leads to doing away with the large number of errors and create a better system. I do not think it would hurt the members of examining boards who are examining on anatomy to brush up just a little bit on this new work. It will help them and help the profession very materially. I think we are in duty bound to accept some one general plan and have one common system and one in advance of all the others that have preceded it.

DR. MOSES JACOB (Knoxville, Tenn.): Mr. President, I feel very much like one of the gentlemen said a few moments ago: I do not think it is the adoption of anything new, it is a selection of the fittest; that is, the most simple. And if there is any hardship to be imposed on anyone it would be, as Dr. Adams said, for the college professor or a member of the examining board. I think they should be willing to do that much work in order to benefit those concerned.

DR. MURPHY: With regard to the man who has learned one nomenclature who does not wish to give it up, I would point out that he does not wish to give up that nomenclature himself and neither does he wish to learn the new nomenclature, but he insists that the student learn four or five. I fail to see the consistency of that. I remember the state board, that Dr. Cook is familiar with, did not allow synonyms to be given, in spite of the fact that applicants were from three schools, each using three different text-books.

DR. JOSEPH HUGHES: I just want to cite a single example that came under my observation to illustrate the necessity of a new nomenclature. In a certain examination one of the questions in anatomy was: "Describe the reed." That was all there was to the question and there was a certain student, who was pretty near a first-class anatomist, who took that examination and positively fell down on that particular question. He dropped it and came back to it, tried it again, and could not get it, and he was honest enough—more honest than the average student—he did not ask his neighbor what a reed was anyway, and he failed on it. Now that is one indication of what a single term will do which is unknown. I might say in answer to those who do not know what a reed is, that it is the name for one of the stomachs of the ox. It is called also the abomasum, and rennet. We have to master all those terms. Describe the abomasum; describe the rennet. We must know all the names. We must also know

that it is called the reed. If there was only a single term used it would be easy.

The president then put the motion made by Dr. Newsom adopting the report, which was carried unanimously, whereupon an adjournment was made until two o'clock.

MONDAY, AUGUST 26, 1912,
2:00 O'CLOCK P. M.

THE PRESIDENT: Let us come to order, gentlemen. As our attendance is small we had better not undertake the election of officers until there is a larger number present. We may go on with the regular program, however.

The first paper on that program is by Dr. E. A. A. Grange, of Toronto, Canada. I understand from the secretary that the paper is here, but Dr. Grange is not here, if you desire it the secretary will read the paper. He says it will take about five minutes.

The secretary read the paper.

FIELD WORK IN THE TRAINING OF VETERINARY STUDENTS.

BY E. A. A. GRANGE,

Toronto, Canada.

In bringing the subject of my paper before you it may be well at the outset to state what I mean by "field work" in the training of veterinary students, and will say that I mean that kind of work with which the recent graduate of a veterinary college will be brought face to face when he enters upon the duties of his chosen profession; when, as it were, he makes his bow to the public as a full fledged veterinarian.

I do not intend at this point to take up your time with my own opinions as to the advantages and disadvantages of laboratory training, which upon the whole I regard with great favor, for it has no doubt been thrashed out from beginning to end in every veterinary college in the land, but I will go a little beyond college training and figuratively speaking encounter our patron or client while searching for some remedy for an ailing animal. And let me say here that the future of a young man often depends upon the impression he makes at the start.

The finger marks of his college will often stamp him, but not always, therefore we must take him somewhere, where he will be in daily contact with the public, but behind the cloak or screen of a preceptor, there he will learn amongst other things how to

approach his patrons in every day practice, and he learns, if in good hands how to handle different species of animals or even different animals of the same species.

In order that importance may be attached to the work under a preceptor, we have recently had prepared that which we call a preceptor's certificate, which reads as follows:

PRECEPTOR'S CERTIFICATE

FOR THE

ONTARIO VETERINARY COLLEGE

TORONTO, CANADA

Date..........................

THIS IS TO CERTIFY that..
(Name in full.)

practiced as a student of the ONTARIO VETERINARY COLLEGE under my supervision for................months during the year 19....
............................Preceptor.
............................Residence.
Graduate of...............Veterinary College.

Experience has led me to believe that even these condensed sheets are met with approval, both by the student and preceptor alike.

Further to increase the interest of students in preceptor's work, we have recently adopted the plan of giving scholarships to students, the terms of which are published in our annual calendar as follows:

SCHOLARSHIP OFFERED BY THE COLLEGE

One to the first year and one to the second year of 1911-1912.

The student who prepares the best report on a case of disease treated by him during the summer vacation of 1912 while under the supervision of a preceptor, will have the amount of his college fees for the year returned to him.

Providing first, that the selected report of the case shall be prepared by the author in his own handwriting, and shall be read and defended before the Science Association of the Ontario Veterinary College, and accepted by the college before the award is made.

The report must be deposited at the executive office of the college, on or before October 16th, 1912.

Competition for the scholarship is open only to undergraduates of this college.

I notice on looking into the requirements as far as field work is concerned in other professions, law and medicine, that in many colleges the preceptor method of education receives much consideration; in law the writer has recently been informed that the student is not only required to attend a certain course, but he takes another course under a preceptor, and is not permitted to take any other line of work until he has finished his law course.

The medical colleges vary a good deal, some requiring a certain amount of hospital training before the course is finished, others accept preceptors' training, while still others require both the hospital and preceptor's work.

In our work we permit the student to write upon his final examinations, but in those cases, where the preceptor's certificate is not satisfactory, we withhold our diploma until an approved certificate is provided.

Feeling that your program is loaded to the hilt I make my paper exceedingly brief, but trust sufficient has been said to excite the discussion of that which some day, if not at present will become a burning question in veterinary education.

DISCUSSION.

THE PRESIDENT: Gentlemen, you have heard this paper. Any remarks?

DR. C. A. CARY: Mr. President, this is rather an important subject for college men. There are some things about it we ought to commend to colleges and faculties. There are one or two points that I look upon as important in field work, if you call it that, that make it rather difficult. I find it is very difficult to get places for undergraduates. It is rather difficult to find active practitioners, or enough of them, who are willing to take undergraduates during the summer vacation. It is difficult to get preceptors in practice who are willing to be troubled with an undergraduate student during the summer without pay or without compensation. It is true, the student may do some work and probably a great deal of which will be of advantage to the practitioner, but there are some practical difficulties along that line that I have found. I would like to hear from members here along that line.

THE PRESIDENT: Gentlemen, this is a very interesting topic, not only to college men directly but to the profession at large. I would be glad to have you discuss it if you will.

I would like to say a word on this subject that perhaps will lead to a discussion. Four years ago the problem of the vacation period training of veterinary students was discussed quite a good deal. I recall parti-

cularly a paper by Dr. W. L. Williams covering the field pretty thoroughly from his viewpoint, and holding that the average practitioner in the field was a very poor clinical instructor for a student; that few of them were equipped with teaching capacity, and it was very problematic whether the average student receives any real, practical training from the veterinarian who does not have teaching qualifications. Now there is a business side to veterinary training of much importance when the person to be trained is a student. Certain it is that if he is observant at all he can get from a preceptor something of the business side of his profession. As is said in this paper, by Dr. Grange, much depends on how the student introduces himself to the community, much depends upon the freedom and with what knowledge of the profession he approaches his patron to show that he is competent, and that he may secure confidence and secure success.

The point raised by Dr. Cary is one I should like to hear debated. There are men who have students, at a distance during the vacation period, and there are some difficulties besetting the man who undertakes to tutor a student during such a period. The matter as presented here by Dr. Grange indicates that the college nominates a practitioner to continue a student's instruction during the vacation periods, and to issue a certificate that such instruction has been given, and the college makes it a part of the curriculum precedent to the graduation of the student.

Dr. A. H. Baker: Mr. President, this is a subject that every teacher and every veterinary college is up against strongly. There are two ways to educate a veterinary student. One is in the class room and the other is in the field. I use the term "field" in the abstract with the addition of the regular form of clinic. This field work as represented on the one side by the class room and the laboratory work on the other side is a matter of the very greatest importance to us all, and to the profession in general. A man, that gets his education in a school where clinics are few and far between, is liberated from his classes the middle of June and takes up his classes again the middle of September, and the summer months are dull in practice generally, all over this part of the country, at least, he has no opportunity really of getting any practical field work. The certificate required by Dr. Grange as Director of the Ontario Veterinary College is a very good one, but it is impossible to enforce it. The best that can be done is to recommend students to take two or three months, or more if possible, in the practice of veterinary field work. This field work must be seen in order to qualify a man to take up the practice at the time he graduates. If he has had purely a lecture room or labortory education he has a whole lot to learn after he graduates.

We all know, who have had experience in teaching men, that they learn a thousand times more through what they see than what they hear, and retain it longer. The same is true of veterinary education. What does laboratory work amount to without the microscope? To describe a microbe would not be sufficient, the student must see it. The same thing is true in practice. Laboratory work is all very fine in veterinary education, but to become a practitioner he must see the

thing practically demonstrated; he must see with his eyes what he is going, to do in the future as a veterinarian, for after he finally graduates if he cannot approach a horse and pick up his foot as well as a bystander, he makes himself a laughingstock.

So it is on this question, gentlemen, how far we should let this field work influence our curriculum. And in making these remarks I realize that my theories are antagonistic to the long college course, that is, with the long term. I alluded to the nine months term, taking up the middle of September and letting out the middle of June. Students are absolutely deprived of seeing field work which amounts to anything. They must see it in April, May or June. By the first of July it is practically finished.

Another point: the practitioner needs the assistance of a veterinary student during the spring rush. Then is when most of the obstetric work is done, and he needs the added practice that the spring brings. A course continued till the middle of June, deprives the student of all that practical work. I care not if he puts in six years of nine months, he is not prepared to practice until he has seen practical work.

Dr. M. E. Knowles (Helena, Mont.): Mr. President and gentlemen: I am so over-awed by this array of pedagogues on the subject of anatomic literature that I am rather scared, for I know you are all college men. I would say that you are cheating both yourselves and the boy you graduate if you do not give this practical work.

We recently employed two graduates of one of the prominent colleges. They were very creditable gentlemen, evidently well raised, although they came from the effete East. (A voice: Good.) When they arrived on Montana soil we found that neither of them had ever witnessed or held an autopsy on a bovine animal. There was a fine spectacle. There were two men sent from a responsible college, to positions of responsibility, owing a duty to themselves and to the commonwealth they were to work for. I think that should cause a blush of shame to appear on the face of every educator in this room, the lack of practical education given to the graduates generally sent out, is woefully deplorable. We should take active measures in this meeting to see that these boys are properly educated; that they are given a proper amount of practical education, so that they can make themselves valuable to the public they serve as well as to themselves.

Dr. S. B. Nelson: Mr. President, I feel that everything that we can do for the student, to give him more experience before he graduates, is for his benefit and for the benefit of the public. I do not agree with Dr. Baker that the nine months' term of three or four years destroys that student's ability to do practical work. He gets more knowledge in the hospital of today, in his term of nine months, than he ever got in his term of two years of six months, and under a tutor the other six months, as in years ago. But nevertheless we can strengthen the nine months' course, if it is possible to get the student out to a preceptor during the summer months. To me it is only a matter of degree what kind of a practitioner the student goes to. To me it does not signify so much that the preceptor is a teacher. It is simply that he is a gentlemen

and a good practitioner, who gives the student an opportunity to observe certain things he does, even if he is not able to instruct the student from the standpoint of the teaching in the schools. I know that many a practitioner has a personality which wins in practice. And if the student can go to that kind of a man and see how he can approach the clients that employ him it is good training. Also he gradually learns by being with patients and acquires the ability to handle animals, also to take care of himself so that he does it in an easy manner which induces confidence on the part of the owner and on the part of the animal.

I look upon practice in itself, whether you call it field work or hospital work, as laboratory work of the lecturer on medicine or surgery; and therefore the more that we can get of it for them in the hospital and in the field the better it is for them.

I would like to reply to Dr. Knowles, if he were here, that unfortunately or fortunately in our institution we do not have such great success in the treatment of our patients but that we have plenty of dead animals on which students hold post-mortem examinations; and there is not a patient that dies in the hospital, or outside, but what the students have an autopsy to make, and sometimes they get mighty tired of making them. The difficult thing with us is this that the young man who is attending college today has an exaggerated opinion of his earning qualifications, and we have to put him out with a preceptor because he thinks he knows practically as much as the preceptor or the teacher in the institution. It is the hardest thing in the world today, I think, to get the idea out of their heads, after they have taken two years of general veterinary science, that they do not know more than the whole veterinary institution.

The President: The next paper is by Dr. Otis A. Longley, of Fresno, California, who is not here. I understand that Dr. Archibald is prepared to substitute for Dr. Longley.

Dr. R. A. Archibald: This is a paper that Dr. Longley mailed to me a day or two before I came east.

THE IMPORTANCE OF BIOLOGY AND APPARENT LACK OF KNOWLEDGE OF BIOLOGICS DISPLAYED BY RECENT GRADUATES AT STATE BOARD EXAMINATIONS.

By Otis A. Longley,

Fresno, California.

The subject outlined in the title of this paper is one of the most important that can be brought before this Association at the present time. It is important both to the members of faculties and examining boards.

The object and intent of boards of examiners is to approve or

disapprove the qualifications of applicants; to determine their fitness to practice and to answer the numerous and intelligent questions put to them by many stock owners. At this time very rapid strides are being made in the preparation of biologic products, their application in diagnosis, prophylaxis and treatment of disease. It is a most important branch of our work, bears a very important relation to the live stock interests of our country and most state boards feel that licenses should be granted only to those having a thorough knowledge of this subject. It therefore behooves the faculties of veterinary colleges to see to it that their graduates have a thorough working knowledge of a subject they will have much use for.

It is not my intention to criticize, but this paper is written with a desire to impress members of faculties with the fact that many good men are being graduated without a proper knowledge of biology. I do not believe that the subject is not being taught, but rather that sufficient impression of its importance is not being made upon students and they do not retain it.

For instance, we will all concede that the several tuberculin and mallein tests are good and assist us in preventing financial losses to our clients. In spite of this, owing to the writings of a few persons whose intelligence has become misdirected, we are often called upon to overcome opposition to the employment of these tests where they should be used. Answers given by ignorant veterinarians to the laymen only adds more opposition to the already hard work of the conscientious veterinarian who has the proper knowledge of his professional requisites.

Teachers of biology in various colleges may doubt my statements regarding the ignorance of their graduates on this subject but the California board of examiners has many examination papers that can show what prompted me to select this subject for discussion. Extracts from a few of these may be interesting.

In answer to the question: "What is mallein?" Answer: "An acid obtained from phenol." Later, in the oral examination, the applicant said reaction was caused by its irritant action and when asked why no reaction resulted when injected into a healthy animal, said he did not know. His answers on other subjects than biology were good, but applicant failed to pass. He is a recent graduate of a "Class A," recognized college.

Another applicant answered that mallein was a serum obtained

from the blood of an ass but that he did not know why the ass was selected for its production.

In answer to the question: "Describe briefly the manner of producing tuberculin," we received the following answers: "Tuberculin is obtained from diseased glands of affected animals and is prepared by a drying process and boiling." Another said, "Tuberculin is produced by ——— ——— Co. and is used in two forms, the dry or powder and liquid forms."

One applicant said: "The simultaneous method is indicated where cholera has already broken out in a herd of hogs." Another common question, occasionally asked by our board is, "What is a toxin, an antitoxin, a vaccine, a bacterin?" Any graduate, especially a recent one, should have definitions for these terms on the end of his tongue, but we find many that get them hopelessly mixed. I could go on for hours reciting many such answers that have been given, but the few enumerated will suffice as an illustration.

What is the cause, for graduates well educated in all other branches of veterinary science, showing such a lack of knowledge of biology? The subject is either neglected, improper examinations given, or the student "crams" for the "ex" and "cribs" through it, making no effort to retain what he believes he will not need or use. This is the attitude many students take toward biology. It's wrong, and they should be impressed with its importance.

Biologic products are rapidly supplanting many of the old line drugs and at the rate they are making progress, will, within a very few years, be our principal therapeutic agents.

It is hard enough for those who have a good basic education in biology to *keep* up with the pace set by biologists and if one gets behind, it's next to impossible to *catch* up. What is the graduate of today going to do about catching up if he leaves college without knowing the difference between a vaccine and a toxin or what mallein is?

This lack of knowledge is not fair to the student, to the college who sends him out, to the stock owner or to those who are in practice and are keeping pace with advancement.

I think the remedy for this deficiency rests in the hands of faculties of veterinary colleges. More emphasis should be placed upon this branch of study and more care exercised in giving examinations.

Again, I say I do not wish to condemn methods at present used by veterinary colleges in educating students, but rather to commend them for the advances made, but I cannot refrain from making suggestions that, if followed, will improve their product and help to make the coming veterinarian better and more capable.

Gentlemen, I thank you.

DISCUSSION.

THE PRESIDENT: Gentlemen, this paper is before you for discussion. College men, I am sure, are anxious to know wherein they come short. They may think they may know. but they would like to be positive about it.

DR. MOSES JACOB: Mr. President and gentlemen: I have not anything particular to add to what has already been said, but it is a fact that a great many of the men who apply for examination for a license, before a veterinary board are lacking so far as their knowledge of biologic matters are concerned; and that, no doubt, is due to faults in the method of teaching, although, like everything else, I think there has been gradual improvement.

DR. HANS JENSEN: Mr. President, the study of biology is such a vast subject that the ordinary individual does not manage to grasp a great deal of it in a lifetime. I do feel, however, that the veterinarian should be thoroughly familiar with the use of the various biologic products, but cannot see the necessity for any extended study of the manufacture of them. The veterinarian should know the practical side of using tuberculin, but if you require that the student should know in detail the manufacture of the various kinds of tuberculin in use, you are asking too much, likewise with mallein, blackleg vaccine, bacterins, etc. There is another side to the problem, we do not know as much about biologics as we shall ten years from now, we have some knowledge of it, but it is in a state of evolution, hence we are not in a position to make positive statements in all cases. The doctor should remember that what is true of San Francisco and Kansas City is true of any other college, that some men slip through who are weak on certain subjects.

THE PRESIDENT: I was hoping that you would get into the merits of this problem. Schools are doing all they can to try to qualify the men as far as time, material and circumstances will permit. The profession in this country is impressing itself very strongly with the idea that men should be better qualified at every point; they should see to it that state board examinations are made more comprehensive. The students seem to be inefficient here and there on some theme, which is made plain when we hold these state examinations, and colleges should be shown where the difficulties are. They want the cooperation of the examining boards. The colleges are finding that some boards have peculiar notions

about examinations. Questions come up: "Who gives the examination?" "Oh, he is a hard man to get by," or "That is a hard theme to qualify for." That is a state of affairs among examiners and that should not be. The student should feel that if he has to take a state board examination that he would just as soon take it in Pennsylvania as in Ohio, and in Ohio as in Pennsylvania. When state examining boards get together and take a wide interest in this problem and help solve it, the student will go out more proficient than he is today. They have passed the gamut of their own institution and the state examinations should mean the same thing everywhere.

Dr. Joseph Hughes: Mr. President and fellow-members: If there was held a practical examination by a state board of examiners would it not be possible to find an array of ludicrous mistakes made by students who are thoroughly skilled; if they were subjected to a practical examination and then their examinations criticized in the same way that the paper of the veterinary student is criticized? Our student body is made up of men who may be a bit deficient in education or our student body may be made up of men who are highly educated, and the man who is deficient in education is liable to fall down on the question of biology; also the man who is highly educated is liable to fall down on the question of practice. It is a pretty difficult matter to get uniformity in examinations. If we had practical examinations as well as written examinations I think we could say that the results to be reported here, would be equally ridiculous.

Dr. R. R. Clark (Hampton, Va.): Take the subject of a practical examination on mallein. There were fourteen candidates before one board, and there were fourteen questions put as to the application of mallein as one of the methods for diagnosing glanders, only six put on paper or could tell orally how to conduct any one of the examinations for diagnosing glanders that would be acceptable to the government. I do not know if that was the fault of the student, the college or the examiners. Men from all over the United States come to take the examination and we must make the examination suit the condition in our state. A man may not be up on the conditions in the particular state in which he is desiring to practice, if he is not he is not fit to practice in that state. This is why some of them fail in their examinations.

Dr. H. Jensen: Mr. President, that seems to me a very broad statement. A man comes from one part of the country, say, to locate in the state of Virginia, and because he is not able to meet local conditions in reference to some certain diseases prevalent in the locality you bar him from practicing; that is hard. I defy you to find any man who is able to meet all conditions in every state of the Union. That should not disqualify him. If he wants to go to Virginia, for instance, and he is interested in his own welfare he will qualify and familiarize himself with the conditions he is to handle. I do not believe that a man otherwise proficient and having a well-rounded education but not familiar with local conditions should be turned down. One of the members of the state board of Nebraska asked a local question at an examination and

a great many of the applicants failed to answer it correctly As a member of the board I said we could not reject the men on that point. The question was what parasitic disease was held to be the most prevalent in Nebraska. The mere fact that an applicant is not familiar with local conditions should certainly not disqualify him.

DR. W. HORACE HOSKINS: I did not so understand Dr. Clark, that he would make the line hard and fast in that direction.

DR. JENSEN: If I misunderstood him, all right.

DR. HOSKINS: The state of Pennsylvania obtained a state examination. The people of the state fear that we are going to establish so high a standard in the state of Pennsylvania that we are going to deprive the state of a sufficient number of men to practice. I think that is true of many states, and many of the newer states need veterinary surgeons. If they cannot get the brightest and ablest men they must make their examinations so that a large percentage of the men will pass them so that the state may obtain a sufficient number of men to practice within the state. I know, in the early history of Pennsylvania, we were more liberal in the examinations than we are now. We have added materially to our examinations and made them more strict. I thing Dr. Clark might do something in Virginia that would not apply to Pennsylvania. In Virginia there are many districts where highly educated men would not go because there is not sufficient inducement. So they must make their examination liberal till such time as the state is fairly well supplied with qualified veterinarians. I know these conditions have to be met in most of the states before stricter laws are granted by the state legislature.

DR. L. A. KLEIN (Philadelphia, Pa.): Mr. President, I hardly think that the paper by Dr. Longley requires very much discussion. Ordinarily, as Dr. Hughes has stated, there is very much analogy between the veterinarian who is deficient in practical subjects and the one deficient in biologic subjects when he applies for a license before the state board. For this reason, I think that the man deficient in biologic subjects, such as the preparation of biologics, is a pretty dangerous man to allow to practice in the community. We who believe in sanitary work believe that the subject of biologics is very simple and I think the state board cannot be too severe on this subject in the examination of applicants for licenses.

DR. R. R. CLARK: I should like to ask him if he refers to preparation or to use.

DR. KLEIN: Preparation and use also.

THE PRESIDENT: We created a committee on Resolutions this morning and this committee would like to have the assistance of the members. Bear in mind that if you have any subject you think it wise to pass a resolution on to draft it and put it in the hands of the committee.

The next paper on the program is by Dr. J. F. Morel.

Dr. J. F. Morel then presented his paper.

RECIPROCITY OF VETERINARY MEDICAL BOARDS ON AN EQUAL BASIS.

By J. F. Morel,

Portland, Oregon.

Considering the fact that the laws regulating the practice of veterinary medicine, surgery and dentistry in the various states differ in some instances, not so much from a medical standpoint, but in the preliminary requirements, this paper will take in view a number of states forming a group whose preliminary and medical requirements are uniform or nearly so. According to the different requirements to practice the veterinary profession in the United States, I think we may classify the above in five groups:

1. Those requiring a high school graduation, or an equivalent, prior to the taking up of the study of veterinary medicine.
2. Those complying only with the rules and regulations established by the Association of Colleges of the American Veterinary Medical Association.
3. Those having no preliminary requirements whatever.
4. Those granting a license upon presentation of diploma.
5. Those having no veterinary laws whatever.

The object of this paper is not to make a plea for interstate reciprocity indiscriminately, but purely and simply on an equal basis. Therefore the state examining board whose requirements demand a high school education could not exchange a license with a state whose requirements are not equivalent, exception being taken where the candidate, besides having in his possession a state license issued under different conditions, would be a high school graduate. There would be no question and no reason whatever for a state board requiring an examination to reciprocate with a state granting a license upon presentation of a diploma. But there is a question when, and there should be a reason why, a state board refuses to grant a license to a graduate veterinarian whose requirements come up to the standard, who passed a successful examination before a state examining board, and who is refused a license to practice in a state whose requirements are equivalent to those of the state in which a license was issued previously.

If a qualified veterinarian passes a successful examination in

Iowa, for instance, and is granted a license to practice his profession as a veterinarian in Iowa, can anyone state why this veterinarian is not able and capable to practice his profession in Oregon or Washington, without having to submit himself to another examination, providing Iowa's requirements, if not more stringent, are at least equivalent to those of the other states? If a man changes from one college or university to another institution of a similar character, he is generally given credit for the work he has done and accomplished successfully. By doing so the college or university registering the student is not only doing *justice* to the matriculant, but it is giving the right *recognition* which the other institution deserves, providing the latter comes up to the required standard. If our leading institutions of higher education take this stand, why should our state examining boards have any reason to differ and oppose themselves to what is generally accepted as fair and square to the student? Our state laws should make provision to that effect and recognize to its full value the requirements in force by other state boards. The idea of compelling an old practitioner of veterinary medicine and surgery to pass a state board examination, and meanwhile consider him on the same footing as a young graduate just out of college is, to my mind, a most unfair proposition and a great injustice to the veterinary profession. If a graduate veterinarian passes a successful examination before any state board in America, if, besides his veterinary training, he can comply with the preliminary requirements of a state in which he wishes to register, he should be entitled to register without any further proceedings. In the latter the moral and ethical question should be considered as well.

The medical profession of America has taken up this matter a long time ago and reciprocity exists between the examining boards of the various states in the Union, which allows a physician having once passed successfully a state board examination, to practice his profession in other states whose requirements are similar to the state in which he took the examination and subsequently secured a license.

Our states should give every examining board the privilege to consider the applicant's credentials before giving him a test, and then give him an examination accordingly. The requirements of our state boards of today are such that an older practitioner is practically incapable of answering a great part of the

questions asked him, and is consequently unable to pass a successful examination, and in many instances is completely barred out from practicing his profession in other states, in which, from a legal as well as a moral standpoint, he should be entitled to practice. Would you expect a graduate of fifteen to twenty-five years ago to answer correctly the questions asked today in histology, pathology, bacteriology, etc., while a younger graduate taking the same examination had the opportunity to familiarize himself thoroughly with these subjects, which today form a most important part in the curriculum of our colleges? Is this fair competition? I will agree that every professional man should keep himself up to date and devote part of his time to the study of modern medicine and surgery, but notwithstanding the fact that a great number of us are doing so, are all practitioners able to do so, and are they all given an equal opportunity? No, of course not—with the exception of the practice of medicine, surgery and the study of modern therapeutics, he will undoubtedly be exceedingly rusty in all branches covering the curriculum of the first two years spent in college.

Interstate reciprocity on an equal basis would only give an equal opportunity to the veterinarians to practice their profession in the different states of the Union. It is understood that the object of this paper is not to indulge in or ask for registration by courtesy, for if the latter is to be taken up it must be on its merits. Registration by courtesy cannot be done on the same basis as reciprocity. Registration through reciprocity should be the object of the following considerations:

1. That all applicants for license be graduates from recognized veterinary colleges in good standing and repute, those recognized by the American Veterinary Medical Association.

2. That the applicants for license through reciprocity produce evidence that they have passed a successful examination before a state examining board.

3. That the statutes of the state in which the applicant passed an examination, require a test at least equivalent to the one given in the state in which he desires to register.

4. That in all cases where an examination has been given, the applicant receives due credit for the work he accomplished successfully.

5. That the examining board of the state in which application is being made for license, in case of mutual reciprocity, has the

privilege to demand, whenever deemed necessary, the papers and grades of the applicant from the state in which examination was held.

6. That no license be issued to an applicant whose license has once been revoked.

7. That no *non-graduate* licenses be taken under consideration.

8. That all states reciprocating with one another adopt a uniform pass mark.

9. That all licenses be issued only on mutual reciprocity.

The only solution to my mind to give the American veterinarian an equal opportunity, after he has once produced his credentials and proven to be proficient in the practice of his profession is the creation of a national board of veterinary medical examiners under the supervision of the American Veterinary Medical Association or the federal government, but as I am not wishing to deviate from the title of this paper, I will not aim to discuss this matter, but will content myself with mentioning it.

My object is to ask for fairness and equality, giving the old as well as the young the opportunity that we are all looking for—a fair and square competition conducted along the most ethical lines possible and the abolishment of exclusion.

DISCUSSION.

The President: This paper by Dr. Morel is now open for discussion, Gentlemen.

Dr. George R. White (Nashville, Tenn.): Mr. President I would like to ask one question: How many of the states are reciprocating in the practice of medicine?

Dr. J. F. Morel: I think quite a number.

Dr. George R. White: My impression is there are very few.

Dr. W. Horace Hoskins: I made some investigations of that matter some years ago and did not find any that reciprocated. Dr. Morel has taken up a subject that has been under consideration for many years, and so far as we can now look forward we seem to be as far from the solution of the question as we ever were. Take the situation in New York state. The board of regents has made so high a standard of entrance requirements there, for those entering veterinary schools, that the board absolutely controls the privilege to practice in the state of New York, and probably sixty to seventy per cent of the graduates from the other schools established throughout this country are estopped by the standard of entrance requirements in that state. For four or five years Ohio reciprocated with Pennsylvania and they accepted licenses from

one another on the examination, but when the matter was referred to the attorney general he decided they could not do that. He decided that the law forbade the acceptance of a license from Ohio without passing the require examination in Pennsylvania.

State boards change every year and the standards of those state boards change accordingly. One of the boards of examiners in one of the eastern states had a man associated with it who had taken a most active part in higher veterinary education and had established the highest possible standard in the state, so high that the board could not accept licenses from the state of Pennsylvania. Three men were recently placed on that board, not a single one of whom had for the last twenty years taken the slightest public interest in higher veterinary education. How will you correct such wrongs? Every board interprets answers to the questions they submit in their own way, and in their own light and opinion. It is not always fair, I say, to the applicant by any means, because many times the applicant for the license knows more than the examiner on the subject that is allotted to him. There is just one remedy. Our committee considered the question of the recommendation of a veterinary board for the United States. The proposal was more than we could handle in the present session of congress now about to close, and therefore we were forbidden from undertaking to carry through there any measure that looked to the establishment of a federal license by a natural board of examiners. It is impossible to do it in each of the forty-eight states with their different laws, but it is possible, and that is what is being advocated today, by the foremost members of the American Medical Association, that we should have federal licenses granted under some conditions, such as civil service conditions, the same as any other branch of the federal service. These licenses should be so hard to obtain that it would be a fair recognition and a fair exposition of the standard of veterinary education. We certainly must become more and more impressed with the necessity of establishing in a federal way some standard in the United States. It can be done. I do not believe there is a state with an examining board who would not accept a license granted by a federal commission, free as it is from many of the influences that must prevail in the states, to change and modify its standard from time to time, and free from many of the influences that state boards are always subject to and must be responsive to. I believe it is possible to have a federal license that any state board would be glad to accept; and a man would have to prepare himself to pass that standard before submitting himself to practice in the state, and it is proper, I think, that a federal license should be accepted by that state as a sufficient license for that man. This would cover the age limit. A young man is far better able to pass an examination today than I was over thirty years ago, when I graduated. I am debarred from New York because of my preliminary education, and I doubt whether I could pass. I challenged my good friend Dr. Cook, from Ohio, last year that if he would pass the Pennsylvania board I would try to pass the Ohio board and I believe we would both fail.

Dr. George H. Glover: I think perhaps the prime object in reciprocity

in state licenses is to help out the man who graduated twenty-five years ago. While he is a good hardheaded practitioner, yet in many cases he is not competent to go up before a modern state examination board, and when he wants to move to another state it would be very convenient if he were allowed to be handed out a certificate to practice in that state. Now the fact of the matter is that the state laws in many states are such that an interchange of licenses is impossible. There is no way of getting around it excepting perhaps through this proposition of a federal license, and that will not help out the man I speak of. Now really, why should not this man, who graduated twenty-five years ago, if he has read the magazines and been a student, as he should be, why should he not be willing to take the examination? I do not see the reason for this reciprocity except to help out this proposition. When we take up the matter of a federal license we are bitting off a great big piece, and it will not help out those who are expecting to get help through this arrangement. We must go a longer route and get reciprocity by changing our state laws, and the sooner we get that the better. I do not see wherein any legislature would be opposed to it. It should be adopted by the legislature; at any rate it should be recommended by veterinary associations to the legislatures in the various states. I think such an amendment could easily be enacted and then if there were proper fraternal spirit we should have reciprocity. I do not believe there is an easier route. We must go the long route, and the sooner we begin the better.

Dr. T. G. Roger: (Trenton, New Jersey): Mr. President, in order to bring out the other side, I will amplify the remarks of Dr. Hoskins. After ten years on a state board this has been very strongly impressed on my mind: That the first essential towards reciprocity between state examining boards is that the teaching schools shall formulate a single standard of graduation. Today they do nothing of the kind. Now in order for the state board to be of any service whatever to its community it must certainly set as high a standard as that of the foremost veterinary medical school, on the continent. If it does not it fails of its purpose. If the state board does not set as high a passing standard as the veterinary department of the University of Pennsylvania it is a perfect farce for a man to come up before the New Jersey state board and give his ten dollars to get a state license to practice. It is a famous joke. On the contrary, what are you going to do with the sliding through easy school? We have got to admit, those of us who have been on the state boards, that there are schools of that standard and until you make the curriculum more nearly equal I am afraid this question of reciprocity will always remain.

The state does not concern itself with the future at all. The state is merely concerned in getting good men to practice in its borders.

In regard to the question of age, it has occurred to me it might be effected in a simple manner by putting an age limit on the man, who has practiced say for twenty years in the state, who sees that for certain business reasons he should make the change; I see no objection to allowing him to do so. That would be reciprocity in his case. But it would not be fair to make it general on that account, because it would put a premium

on lack of knowledge. The man with a little knowledge would be on a par with the man with a great deal. And whether a man is twenty-five or fifty-five, it would hardly be a square deal.

In regard to the veterinary examinations it seems to me, with Dr. Glover, that the states today are hardly in the right temper, however desirable it might be, to abrogate their privilege so far as to allow the federal government to say who should and who should not practice veterinary medical surgery in their borders. It is a different thing to have a veterinary examination for England, Germany, or France. The states have power to regulate those things for themselves. I expect that a great many of the states would be very tenacious in holding to their power, and for myself I see no present hope of a fair reciprocity.

Dr. V. A. Moore (Ithaca, N. Y.): The statement was made a while ago that so far as the speaker knew among the medical profession there was no reciprocity. Would it not be fair to refer to a paper entitled "Laws Regulating to the Practice of Medicine in the States," published by the American Medical Association, where you will find a synopsis of the laws regulating the practice of medicine and also a table showing reciprocity? I cannot recollect exactly now the states reciprocating with each other, but for example I will say that Michigan reciprocates with New York and New York with Michigan. I know that many other states do the same. In fact I feel safe in saying from a third to one-half of the states reciprocate. One state reciprocates with several states, or one state will reciprocate with one state and with another will not reciprocate at all. Therefore, the argument as to the medical profession does not apply to reciprocity amongst us at all. I will also refer to the American Journal of Medicine of New York, connected with the National Association, and you will find, bi-monthly in their papers that they mention the reciprocity given by the different examining boards.

Dr. W. Horace Hoskins: But those with reciprocal relations are under so many conditions that it is almost impossible to carry them out. New Jersey has a reciprocal clause in her law, and she has divided the subjects for examination, and added one or two more than Pennsylvania requires, then New Jersey decided she could not reciprocate because her standard was higher, as she had thirteen subjects and we had eleven. Those reciprocal relations have utterly failed, and I believe they will continue to utterly fail. Now Dr. Rogers has set up something and knocked it down. I did not and do not advocate it. I know it is utterly impossible to have a federal license compulsory. I believe I said that a federal license would be accepted in the end by a majority of the states. It would be easy of modification. I doubt very much whether there are many states that would disapprove. We have had it already in experience. There is not a state in the Union that is not willing to join with the federal government in stamping out all forms of infectious diseases. They have cooperated time and time again. While at the start there may be questions as to how far cooperation should go, it was not for long and the cooperation was effectual. I believe in the federal license. Such a license would give a standard to the veterinarian in this country. With that federal license I would

make a man eligible for any service in the government, whether in meat inspection or the quarantine service; whether it was in the army service or a civil service position, so that it would be a fixed and definite standard. There is no difficulty about carrying it into effect. The only difficulty is that we had a divided house at Washington. This is a day of retrenchment and of civil service. One man said: "If you will get sufficient money to carry it out it will be carried out." I had one bill on my hands that promised to add something additional to the cost of the country and it was just about too much to get that through.

Dr. C. C. Mills (Decatur, Ill.): There is one point that I think is very hopeful so far as federal licenses or, rather, federal examinations are concerned, and that is that most of the states now recognize inspection by federal officers. I mean to say especially by the veterinarians of the bureau of animal industry in admitting live stock from one place to another. They must be approved by an inspector of the bureau of animal industry. The states do recognize the standard set by the federal veterinarians. If we had such a measure it would soon of its own force make its way in the majority of states.

Dr. Hans Jensen: Mr. President, whether reciprocity is obtained by means of federal license, or interstate action, the fact of the matter is, it is accomplished in one branch of science today in this country and that is pharmacy. There are today thirty-five states reciprocating with one another. How that was accomplished I do not know for though I am somewhat interested in pharmacy, I have not taken the time to find out. The fact remains that it has been done, and I cannot see but what Dr. Glover's ideas can be worked out. It can be done in the veterinary world in the same manner that it has been accomplished amongst the pharmacists of this country.

Dr. Tait Butler (Memphis, Tenn.): Mr. President, I do not want to prolong the discussion but it occurred to me to state one particular illustration that came up, to show how impossible reciprocity is under present conditions. I was on the state board of examiners in North Carolina, and when their law was passed there were not to exceed fifteen graduated veterinary surgeons in the state, and there were about 400,000 mules and horses, as many cattle, and over 1,000,000 hogs. That represents no big wealth as compared with some of the live stock states, but it represented a great deal of wealth to the people of North Carolina, and it was important to them that they should have better veterinarian services than they were getting. I believe the state examining board of North Carolina would have made a serious mistake if they had made their standard comparable with Ohio, where there is a large number of veterinarians. I only mention North Carolina because I have particular and specific information in regard to that state. But I am familiar with all the southern states, and I want to tell you that you can take them right across, include all the southern states, any section, where any ordinary graduate would have been of great service to the community if he had come from any one of the northern colleges. I believe the state examining board would have been unjust, and not have carried out the purpose for which the board had been appointed, had it raised the stand-

ard so high as to prevent average men coming into the state to practice. I believe you can get conditions better only by making your standard low to start on and gradually raise it. Conditions are growing better, and until we can get conditions so that they are somewhat similar every where reciprocity is impossible. Conditions are not and cannot be for a number of years similar in New York, Pennsylvania, Ohio to what they are in Alabama, the Carolinas and the other southern states.

I want to add, while I am on my feet, my approval of Dr. Hoskins' advocacy of the federal license. I do not care whether they pass one or twenty. Every one they pass will be a step in the right direction. I believe since the states do recognize the inspectors of the bureau of animal industry they will recognize federal licenses of veterinary practitioners. The time will come when we will have such a federal license in all professions, and when we do we will have made a very marked step forward. I do not say that it will solve the questions that arise in the state boards by any means, but it will be a step towards solution if the men they are considering have obtained a federal license, they will not have to pass a half a dozen examinations. I think we should work towards that idea.

Dr. J. F. Morel: May I ask what is meant by reciprocity? Do you mean by reciprocity, general reciprocity or reciprocity between two states? My plea was not for general reciprocity but for reciprocity on an equal basis. I mean, for instance, in Washington and Oregon. They should come to an agreement to reciprocate provided they are on an equal basis. Also New York and Pennsylvania provided the entrance requirements are the same. We do not expect reciprocity from New York at present because they have special state requirements, but there is no reason why in the west Washington and Oregon cannot reciprocate with Idaho for Idaho has no veterinary license laws whatever. Reciprocity should be on an equal basis.

The President: Now we will take up the next paper.

HOW STATE EXAMINING BOARDS MAY INCREASE THE EFFICIENCY OF VETERINARY INSTRUCTION IN COLLEGES.

By Louis P. Cook,

Cincinnati, Ohio.

Mr. President and Gentlemen:

My paper will be brief and pointed. I will point out one effective way of accomplishing that result and that is by publishing the facts relative to the matriculation and graduation requirements of the various veterinary colleges. The papers written by the applicants examined by the thirty-two state examining boards in the

United States will show exactly what the requirements of our veterinary colleges are, and they offer indisputable evidence of the relative efficiency of the colleges. The annual announcements of the colleges show what the colleges say they require and what they do. The papers presented by the graduates to the various state examining boards, however, show what the colleges actually do require for entry and what they do actually teach. So that you will have and can get from the examining boards positive evidence of what is going on.

As a means of determining just what each college requires of its matriculants and of its candidates for graduation I respectfully suggest that this association put into operation the publicity plan I proposed to this body at its annual meeting in 1909. If this were done colleges could not admit an educationally unfit student nor graduate the technically incompetent one without the fact being made public. Until you do keep tab on the colleges they will continue to admit any and every applicant who has the money to pay his tuition, and graduate every man who has paid his fee and attended the course, regardless of his qualifications for either matriculation or graduation.

So our veterinary colleges should have a system for accurately grading their efficiency as educational institutions, and if you propose to tell the world just how well or how poorly they are educating their students for veterinary work, then the colleges will soon wake up to the fact that they cannot admit and graduate the unfit without lessening their reputation and standing as graduating institutions. You need not tell them what such laws would mean to them. They will know that it would mean ruin. They will then and only then will they discontinue matriculating students who can scarcely write, and they will then and not until then will they discontinue conferring the degree on an individual who possesses no more or little more veterinary knowledge or skill than the average quack possesses.

In my possession as secretary of the Ohio state board of veterinary examiners there are telltale collections of papers that bear out my contentions that practically all of the colleges need watching.

In failing to establish and maintain some fair, impartial and accurate system for determining and publishing facts relative to the character and efficiency of the veterinary colleges of America this association has been and is guilty of gross neglect of duty

to the veterinary profession. Since 1908 the United States department of agriculture has maintained a sort of supervision over the veterinary colleges of America. Uninformed persons seem to believe that this government supervision is sufficient to keep the veterinary colleges of America. Uninformed persons seem I have the documentary evidence to prove that it is not.

The department has established a minimum entrance requirement, but it has established no way of determining whether or not the colleges conduct the entrance examination honestly, and the department has absolutely no way of determining the proficiency of the graduates of today.

Under our present system the colleges can admit young men who can write a legible hand, and they may graduate anyone regardless of his qualifications and still enjoy a good reputation. There are incompetent graduates who go before the examining boards and show their lack of education and training, but the boards do not expose the colleges, who therefore continue on the even tenor of their way.

DISCUSSION.

Dr. E. J. Drake (Toledo, Washington): Mr. President, as secretary of the Washington state examining board I want to say a few words. Dr. Cook has commented on the standard of the colleges, I do not think our records will show what Dr. Cook has stated. I have all the papers of fifty-two applicants in my possession, and out of those fifty-two I found only two which would bear out the sort of statement that our friend has given. The defects in one paper, I believe, could be attributed directly to the individual himself. His college training was all right, but this man had tried, since he left his mother institution, to forget about all he ever knew. There was only one paper out of the fifty-two, if I remember correctly, that would bear out the majority of the statements Dr. Cook has made. So I for one want to commend the institutions all over the United States in general for advancing as they have done in the last few years.

Dr. Hans Jensen: I feel Dr. Cook is in a position to know. He is in the business. But notwithstanding that fact will say that while I served on the Nebraska board for something like four years I had a remarkable experience. I dislike indulging in personalities about schools, but assure you it was an eye-opener to me. I studied them thoroughly and came to the conclusion that the college had nothing to do with it. It was the individual.

One applicant appeared before the board a couple of hours after the examination had begun and requested that an oral examination be given him owing to the lateness of his arrival. He appeared to be a very clever

gentleman, wearing a great number of precious stones and supplied with an abundance of expensive cigars that were freely passed around, thinking that perhaps they might soften our cold hearts. His request was granted and I handed him a set of simple questions in materia medica and therapeutics. He looked the questions over and handed them back with the remark that he could not do anything with them. My answer was that I could do nothing further for him. Later I received a letter from the said applicant stating that unless he was passed he was going to fix me with the governor, and that he did not propose to be turned down by such a bum outfit, or words to that effect. I later received word from the governor and a second examination was given the applicant with the same result. This man was graduated by one of the foremost institutions of the country, and so I say it is sometimes the individual and not always the school.

Dr. T. G. Rogers: I fully agree with Dr. Cook after ten years' experience. I have in mind the kind of knowledge that is gained after a three or four years' course, that induces a man to state that the principal symptom of cystitis is pain in the region of the cyst; and the chemical knowledge that enables a gentleman to say that the chemical commonly known as arsenic is arsin. The trouble is not with the announcement of the school but the lazy enforcement of its announcement. No one can spend a few years on a state board without being convinced that the teaching is generally vicarious or clearly careless.

The President: Gentlemen, is there any further discussion? This is the meat of the whole problem and at the present time is the very thing we must do something about. There are many here who can contribute to an understanding of this problem.

In the opening address, reference was made to the power of state examining boards, and suggesting that if state examining boards would only get together and agree on some general educational points which they would require in their examinations, something definite would be accomplished. True, as has been said here, some concessions may be made in certain states and under certain conditions as to age, and so on, but it seems to me there must be something tangible established by state boards before veterinary colleges are going to do their full duty. Dr. Cook has hit the nail square on the head in his statement and I do not believe any well informed man would gainsay it. Perhaps they would not accept it in all of its inferences but in the main it is correct.

The desire has been expressed several times that there should be some way to check up against the colleges. We must not forget that colleges are conducted by human beings, by just ordinary men who are just as frail as each of you individually are, but they are doing their best to meet the conditions. I believe that they have improved wonderfully, but there is much room for improvement yet. It may seem strange institutions of learning will be lax, perhaps, to those not connected with them, but not so strange to those who have had some experience. Men have presented themselves at veterinary colleges for examination ofttimes, who have been so scared (excited) that when they came to the examination they could not do themselves justice; and the colleges know that men

who have seemingly been inadequately prepared to begin with have been the very best men, the most competent students in the end. So there is some excuse for some leniency. There is not so much excuse for imperfect control of the requirements when they should be graduated. But there is great temptation.

The state examining boards have the key to this examination question. I trust the representatives of the state examining boards here today will get together and hold a conference, personally, as boards of examiners, and if they do and would like a consultation with the college men in what they undertake to formulate, the college men will give of their knowledge of the situation, in so far as they can, to help bring about a solution of this very important problem we have been discussing here.

Dr. John W. Adams: This question, gentlemen, has two sides. One side of the problem confronts us which is, as I sometimes think, to standardize the examining boards, (laughter) and to bring the examining boards up to the point where we wish our students to arrive. In other words, I have to spend a number of hours every years uselessly, I think, so far as instruction is concerned, in warning men who are to come up before the state examining boards that they must be on the lookout for questions that will deceive them and puzzle them. In other words, I have to give them a lot of obsolete terms, terms no longer used, so that when a man is asked to describe the symptoms of coryza he will know that it is the catarrhal discharge from the nasal passage that is referred to, and so forth, referring to terms that he has been taught to use under different names. It is a big question. You will find here and there state examining boards which ask perfectly ridiculous questions. The majority do ask very practical, common sense questions, but there have been men appointed as state examiners who have searched out all the hard questions they could find. A lot of such questions in one instance I recall were on the brain, questions that a brain specialist would be familiar with, but no one but a brain specialist could answer.

In our schools we would welcome the conference of the state examining boards and freely make any suggestions that occur to us that might help solve this matter.

Dr. M. S. Mayo (Blacksbury, Va.): Mr. President, some years ago I had occasion to take a state board examination myself. I passed, I am happy to say, but I think one-third of the questions that were asked were obsolete, when I graduated, twenty-five years ago. The examiners had gone to some old text-book that was out of date. I recall one question that occurs to me now: "What is splenic fever?" I said: "If you will give me the modern term I will try to answer that question," and they explained what they wanted. I think the boards are trying to do right, but the question is, whether anyone who is familiar with veterinary medicine should have to puzzle these things out to know what is wanted.

Dr. C. I. Fleming (Terre Haute, Ind.): I happen to be a member of the state examining board in Indiana and I know that a student may be more capable than he may show himself on examination. The fact is that when a student comes before the examining board he gets fright-

ened. He is looking for something hard. If you ask him a simple question he does not answer it in a simple way. I think a great deal of the students' trouble arises from the fact that they are afraid of the state boards. They know answers to the questions and if they are given an opportunity and are given justice they will answer the question with very little trouble. The doctor spoke of splenic fever. An examiner on that subject asked some questions on the last examination and the student asked me what was meant by splenic fever and I explained. We have followed the principle in our examinations, that where a question was misleading in any way we have tried to give the student a hint of what was meant when answering the question. We try to make the examination simple and on subjects that are well known. If the student is frightened and you start in with a question that goes into a deep subject he will be so frightened it will be absolutely impossible for him to answer any of the other questions. I think examining boards, and I have tried to follow that for myself, should make their questions as thoroughly progressive as they can and if the student is a little bit frightened, put him on the right track. Examining boards sometimes are too severe and give question which so thoroughly frighten the student that he cannot answer them although he is really a capable man.

Dr. Moses Jacob: Mr. President, I have noticed that in this discussion the veterinary schools are trying to put the blame on the examining boards, and the examining boards are apparently trying to put the blame on the schools, and someone has asked how the thing can be regulated. I think the solution to the whole thing depends absolutely on the veterinary profession itself in the state. If they are not interested enough in the veterinary profession nor in the examining board to see that the proper kind of men are appointed on its board, I think they are getting exactly just what they deserve. Therefore, the association in the state, especially the state veterinary association, should make it a point to see to it that right men are put on the state examining board, that is one way to solve the question.

Dr. T. G. Rogers: Dr. Adams spoke a few minutes ago about anatomy. It has been my lot for ten years to examine in anatomy and I always followed one course and it will take but a minute to describe it. I ask the student five questions only. I ask him to describe a bone, for example the scapula; to describe an articulation; a group of muscles and arteries and nerves. I have always tried as far as possible to make these questions fair in practical work. I have always gone further than that. If a man fails on these questions I always try to ascertain in a quite conversational way whether the lack of knowledge is general or particular. But the great point in regard to this question is that at the present time we may have a good state board today and a very, very poor state board tomorrow. Dr. Hoskins hit the nail on the head. I think most examiners try to be fair.

I heard a question put by our state examining board that I did not think was right and it was referred to me and I dictated the answer. The question was: "If you had examined the mouths of the stallions, mules and colts on a stock farm, what operation would you perform?" I told

the student to answer, "Whatever was necessary." And that went. But I think as a rule the examiners try to be fair. Unfortunately we do get occasionally an incompetent student.

Dr. L. P. Cook: Mr. President, in 1909 I suggested a plan that I think will work. A committee was appointed and directed to get from every state examining board in the United States and Canada, and there was thirty of them, a copy of the questions they asked at the last examination, and to learn whether they held an examination each year, and the committee was requested to furnish this information, together with a copy of the questions asked at every examination held. That gave the association something by which to judge whether the examining boards asked fair questions or not. Each examining board was required to furnish the answers to the questions so we could take those questions and find out whether the board was putting up a fair examination or not and we could tell from the very wording of the question whether the man who put it was competent to frame a question or not. That gave the association a line on the examining boards. Besides that, the committee was asked to get a report from each examining board, giving, not the names of the applicants examined, but the number, by colleges. For instance, the Ohio board had two examinations, one in April and one in July and was asked to furnish a list, by colleges, of those examined in April and those examined in July. In April from the Ohio State University, there were so many applicants and so many passed, and giving the grades or grading of each, not the names. And so many graduates from the Chicago colleges, and so many from Toronto, and so many from Indiana, and so on. Along with this was given the examination questions asked. If that were done now and we would get a report from every one of those examining boards you would have something to go by, something by which to judge of the standing of the colleges and you should do it. One year I went to the trouble to get reports. I was not a member of the committee. As far as I know the members of the committee did nothing, and I took it upon myself to have forms printed and sent out getting reports from fifteen boards. In a certain college, I will not name it, they had eighteen graduates examined that year and nine failed. The questions asked at the examination came along with the report so that we could judge for ourselves what sort of an examination those men were required to take, whether it was fair or not. Eighteen examined and nine failed? It looked pretty good for the school, didn't it? There was another school which had forty-seven men examined and only one failed. They were examined not by one board but by possibly twelve. Along with this report was a dozen different sets of graduating questions.

If you put that plan into operation you can determine how accurately the different schools are doing their work, and also tell whether the examining boards are competent or not.

Dr. N. S. Mayo: Mr. President, I dislike to have this meeting adjourn without somebody saying something relative to the veterinary cor-

respondence schools. I wish someone from Canada would say something on that subject.

DR. W. HORACE HOSKINS: I would like to ask whether anybody has heard anything of the London schools for the last six months. I do not know whether they have paid their advertising bills or not but for the last several months there has been no advertising in the journals on the part of schools which heretofore advertised regularly.

DR. C. J. COOK (Paris, Texas): Mr. President, as secretary of the examining board of Texas I would like to get a little information from this body, and that is in regard to the correspondence school that we have in our state, also another school—I hardly know what to term it: It is a machine turning out diplomas and degrees. The examining board is in a peculiar position. It is like this: When the board organized, it passed a resolution that no diploma should be accepted as evidence to admit an applicant to take an examination unless from a recognized college, colleges recognized by the American Veterinary Medical Association. Sometime ago I received notice from a lawyer employed by one of these questionable schools, a like notice was also sent to the other members of the board, stating that he was going to sue the state board for slandering the school. What I wish to know and what the board wishes to know is: Whether the American Veterinary Medical Association recognizes that school. The school now comes out and claims to be a three years' school, but in its catalogue, I think it announces three veterinarians and possibly six or eight M. D.'s and dentists, who have acquired the degree of D. M. S. from this school as its faculty. The preliminary trial is set for tomorrow. The final trial is set for next week some time, and before then we must be in a position to state, positively under oath, whether this school is a recognized school or not.

It also advertises in its circulars to be a school recognized by the bureau of animal industry; also by the American Veterinary Medical Association. I would like to have you gentlemen take action on this and bring it before the Association so that I can go home with positive evidence. The school is the Southwestern Veterinary College of Dallas, Texas. I submit last year's catalogue, also the latest one issued. (Producing document.)

I would like to present a short letter that will give you an idea of the tactics that are used in order to break up the laws that we have in Texas. Here is a letter that is written by the president of this school to a man in Texas:

"Mr. Frank Chalaffant, "Dallas, Texas, July 15, 1912.
"Saratoga, Texas.

"Dear Sir—In answer to your letter of inquiry will state that I am a member of the Texas veterinary medical association and am in good standing. Our school is recognized by the state veterinary medical association and meets the requirements of the bureau of animal industry. I have one of the largest practices in the city. Will further state that you couldn't do better than to matriculate in our school.

"Hoping to have you with us soon, I am

Yours truly,

"(Signed) E. J. Farrel, M.D.S."

Dr. A. M. Farrington (Washington, D. C.): As far as the bureau of animal industry is concerned I can say it is not recognized as a school. The bureau never had any application from it and never had any information that it desired to prepare its graduates for the inspector's examination.

Dr. R. P. Lyman (East Lansing, Mich.): I would suggest we find out if the college is recognized by the American Veterinary Medical Association by looking at the annual report, all recognized colleges are listed there.

Dr. C. J. Cook: Last spring the Texas medical association appointed a committee of three to investigate this school and they reported back unfavorably, saying that they had nothing, absolutely nothing.

Dr. L. A. Klein: If the gentlemen from Texas is going to use evidence in the court I would suggest that he obtain affidavits from the president and secretary of this association to that effect.

Dr. C. J. Cook: I would like to get something definite.

Dr. W. Horace Hoskins: I move the president and secretary be authorized to tender to the representative from Texas a certified or sworn affidavit that this school is not recognized; that it is not eligible here and also is not likely to be eligible in the American Veterinary Medical Association. Dr. Stewart and Dr. Nelson can do that.

The motion was duly seconded.

A Member: Do the members here know anything about the condition of the college? This is a international association representing all the United States and Canada.

Dr. R. P. Lyman: Cannot this be referred to the Committee on Resolutions, they can submit a resolution based on the evidence that may be submitted to it.

Dr. W. Horace Hoskins: It never made application and they have made a statement that is not true that it is recognized by the association. It is not so recognized. It represents nothing. It has no equipment of any kind. We are acting on the best evidence in the world. I am frank to say I never heard of it and there are not very many schools of which I have not heard.

Dr. C. J. Cook: There are two other gentlemen in this room acquainted with the conditions. Dr. Kinsley is one and perhaps Dr. Weber. Dr. Kinsley I know.

Dr. N. S. Mayo: As a matter of fact I believe the gentleman would have to get his affidavit from the officers of the American Veterinary Medical Association and not from this association, because that is the association which recognizes the colleges. Of course, we do here also, but I believe it is usually quoted in the law courts that the college is recognized or not by the American Veterinary Medical Association.

The President: That is correct.

Dr. N. S. Mayo: By going to them personally and getting affidavits from the officials would be sufficient evidence, I believe, for the court.

Dr. R. P. Lyman: We cannot act for the larger association. Consequently I suggest that the resolution be referred to the American Veterinary Medical Association for action there. It seems to me there are

two separate bodies discussing it, and we must refer it to the larger association.

DR. W. HORACE HOSKINS: I advocate that Dr. Cook gets affidavits from both associations; from the representatives of this association, and he can get them likewise from the American Veterinary Medical Association.

DR. A. T. KINSLEY: I think there is no question about getting a certificate from the American Veterinary Medical Association. At the same time, in point of law, the preponderance of the evidence always counts, and if we can get a resolution from this body, as a separate and distinct organization, and one as well from the parent association, such as he desires and must have, it seems to me it would be a little more evidence on the point in question. I had the privilege in March of visiting the Southwestern Veterinary College at Dallas, and am certain there is not a man here who would say or admit that graduates from that school would be eligible to membership in the American Veterinary Medical Association. The college has scarcely any equipment.

The motion was put and carried unanimously.

DR. L. A. KLEIN: I have a question to bring before this meeting that concerns the relationship between veterinary schools and the examining boards, and that is this: Usually in the spring just before the time of commencement, students desire information regarding the names of the secretaries and presidents of the examining boards of the different states, also when the examinations are to be held and what fee has to be paid; whether they must take their diploma, or whether it is sufficient to take a letter certifying they graduated. There is no way of supplying this information. Of course, a man in a school usually has information concerning the examining board of his own state, and probably in one or two of the adjoining states, but there is no way of supplying the information concerning the examining boards in general. So, therefore, I wish to propose a motion that the secretary of this association write to the secretary or president of every examining board in the United States and Canada, and request them to send a circular letter concerning the information regarding their dates of examinations and the conditions under which men are admitted to examination. If this data is collected and sent out each spring it will supply veterinary schools information which will be very useful to the students of the graduating classes.

The motion was duly seconded.

DR. W. HORACE HOSKINS: May I add an amendment that this information be put in printed form by this Association and a copy sent to every member?

The amendment was duly seconded. (Carried.)

The original motion, as amended, was put to the meeting and carried unanimously.

On motion of Dr. Hoskins, seconded by Dr. Ridge, the meeting stood adjourned subject to the call of the chair.

WEDNESDAY AFTERNOON,
August 28, 1912.

A meeting of the Association of College Faculties and State Examining Boards was held at the German House, Indianapolis, Indiana, at the conclusion of the afternoon session of the American Veterinary Medical Association, Dr. S. Stewart, President, in the chair.

THE PRESIDENT: The first business that we have is the report of the Committee on Resolutions.

REPORT OF COMMITTEE ON RESOLUTIONS.

DR. STANGE: Mr. President and Gentlemen:—Your Committee on Resolutions begs to report as follows:

AMALGAMATION WITH AMERICAN VETERINARY MEDICAL ASSOCIATION.

WHEREAS, It is the opinion of many members of this Association that the Association of College Faculties and State Examining Boards could be with advantage combined with the Committee on Intelligence and Education of the American Veterinary Medical Association; therefore be it

Resolved, That the Association of Veterinary Faculties and Examining Boards be made a section of the American Veterinary Medical Association and which shall include the work of the Committee on Intelligence and Education of that Association.

ANATOMIC NOMENCLATURE.

WHEREAS, It is the wish of the Association of Veterinary Faculties and Examining Boards to promote reasonable progress in Veterinary Education; therefore be it

Resolved, That the preliminary report of the Committee on Revision of Anatomic Nomenclature be approved by this Association and that we commend this report to the American Veterinary Medical Association for similar action.

DISTRIBUTION OF REPORTS.

WHEREAS, It is very important that all Veterinary Examining Boards should be active factors in educational advancement, and

WHEREAS, It is probable that all boards will become actively interested and will participate in the work of this Association if its purposes were clearly brought to their attention; therefore be it

Resolved, That the Secretary of this Association secure reports of this meeting and send same to all members of state examining boards and to secretaries of state associations; and be it further

Resolved, That the Secretary procure and have printed a list of all state examining boards of this Association, and of all examining boards; and be it further

Resolved, That the Secretary endeavor to secure a symposium on the relation of state board examinations and veterinary education for the next meeting.

On motion by Dr. A. T. Kinsley, duly seconded and carried the resolutions were considered seriatim and adopted as read.

THE PRESIDENT: I will now call for the election of officers for the ensuing year.

The following list of officers were chosen:

President—S. Stewart, 1336 E. 15th St., Kansas City, Mo.

Vice-President—G. H. Roberts, 214 N. Meridian St., Indianapolis, Ind.

Secretary-Treasurer—S. B. Nelson, Pullman, Wash.

On motion, duly seconded and carried, the officers elect were made a Committee of Constitution and By-Laws.

No further business appearing the President declared the meeting adjourned.

Index to Association of Faculties and Examining Boards.

HONOR ROLL REVISED, 1912.

Allen, F. S., elected 1884.
Bath, W. H., elected 1884.
Berns, G. H., elected 1884.
Bland, Thomas, elected 1887.
Bridges, Francis, elected 1887.
Butler, Tait, elected 1887.
Coates, W. J., elected 1877.
Crowley, C. W., elected 1876.
Dougherty, Wm., elected 1874.
Harrison, R. H., elected 1881.
Hollingworth, G. W., elected 1885.
Hoskins, W. H., elected 1882, Secretary 1888-93, President 1893-96.
Howard, L. H.; elected 1882.
Liautard, A., Organizer 1863, Secretary 1863-1864, President 1875-77 and 1886-87.
Lowe, Wm. Herbert, elected 1886, President 1905-06.
Lyford, C. C., elected 1884.
McInnes, B., elected 1876.
McLean, C. Courtney, elected 1887.
McLellan F. W., elected 1882.
Meyers, J. C., elected 1875.
Osgood, F. H., elected 1881, President 1896-97.
Penniman, G. P., elected 1884.
Peters, Austin, elected 1883.
Pierce, B. D., elected 1883.
Robertson J. L., elected 1868, Secretary 1869-74, President 1879-81.
Ross, Edward C., elected 1884.
Salmon, David E., elected 1887.
Scheibler, J. W., elected 1885.
Sherman, W. A., elected 1882.
Strange, A., elected 1887.
Vogt, A. G., elected 1884.
Weber, S. H., elected 1886.
Williams, W. L., elected 1885.
Winchester, J. F., elected 1878, President 1901-02.
Wray, W. H., elected 1878.

HONORARY MEMBERS.

Adami, Dr. J. George, Montreal, Canada.
Bang, Prof. Dr. B., Royal Veterinary College, Copenhagen, Denmark.
Biggs, Prof. H. M., Bellevue Medical College, New York City.
Chauveau, Prof. A., Director-General of Veterinary Schools of France, Lyons, France.
Dorset, Marion B. S., M.D., Bichemic Division, B.A.I., Washington, D. C.
Hoard, Mr. W. D., Fort Madison, Wis.
Hobday, Frederick, F.R.C.V.S.,F.R.S.E., 165 Church St., Kensington, W., London, England.
Kitt, Prof. Dr. Theodore, Royal Veterinary College, Munich, Germany.
LaClainche, Prof. E., Toulouse, France.
Lavalard, Dr. E., 87 Avenue de Valiers, Paris, France.
Liautard, Dr. A., 14 Avenue de l'Opera, Paris, France.
McEachran, Prof. D., 6 Union Avenue, Montreal, Canada.
McFadyean, Prof. Sir John, Great College Street, Camden Town, London, England.
Mills, Dr. Wesley, Westmount, Montreal, Canada.
Möller, Herr Prof. H., Thierarztlichen Hochschule, Berlin, Germany.
Perroncito, Prof. Edoardo, Royal Veterinary College, Turin, Italy.
Ravenel, Mazyck P., M.D., University of Wisconsin, Madison, Wis.
Raymond, J. H., M.D., Polhemus Memorial Clinic, Brooklyn, N. Y.
Schmidt, Mr. I. I., Kolding, Denmark.
Smith, Prof. Theobald, Forest Hills, Boston, Mass.
Tsuno, Dr. K., Veterinary Department, Imperial University, Tokio, Japan.
Weisse, F. D., M.D., 46 West Twentieth Street, New York City.
Welch, Prof. William H., Johns Hopkins University, Baltimore, Md.
Wilcox, E. V., Ph.D., Department of Agriculture, Honolulu, Hawaii.
Woodward, William C., M.D.,LL.M., Health Officer, Washington, D. C.

ACTIVE MEMBERS.

Abele, Francis, Jr., 18 Spear St., Quincy, Mass.
Achen, F. W. B., 118 Market St., Kenosha Wis.
Ackerman, E. B., 265 Green Ave., Brooklyn, N. Y.
Acres, George Henry, Grand Forks, B. C., Canada.
Adams, Franklin, 224 W. Washington St., Paris, Ill.
Adams, John W., 39th and Woodland Ave., Philadelphia, Pa.
Ahlers, F. R., Lamotte, Iowa.
Aicher, Edward H., Agricultural College, Miss.
Aikenhead, J. P., Easton, Md.
Alcorn, Harvey A., Adair, Iowa.
Alkire, Charles N., Sidell, Ill.
*Allen, F. S., 221 Main St., Nashua, N. H.
Allen, John F., 4 Broadway, Greenwood, Ind.
Allen, Rollin M., Portal, N. D.
Allen, Stanley W., Watertown, S. D.
Allen, Thomas A., Box 541, San Juan, Porto Rico.
Almeida, Anton S., Dixon, Cal.
Althouse, E. P., 809 Market St., Sunbury, Pa.
Ambler, H. B., Chatham, N. Y.
Anders, Thos. O., 170 11th Ave., Seattle, Wash.
Anderson, F. E., 130 E. Crawford St., Findlay, Ohio.
Anderson, F. J., Grand Forks, N. D.
Anderson, Herbert, Dickinson, N. D.
Anderson, John P., 403 South Main St., Rochester, Minn.
Anderson, J. S., Seward, Neb.
Anderson, Thos. E., Bedford, Iowa.
Anderson, William A., Sleepy Eye, Minn.
Andrade, John S., Huntsville, Ala.
Andrews, Frederic W., P. O. Box 655, Mt. Kisco, N. Y.
Annand, J. G., Duluth, Minn.
Applegate, R. C., 410 E. Main St., Bloomfield, Ind.
Archer, John B., Spencer, Ind.
Archibald, R. A., 1724 Webster St., Oakland, Cal.
Armour, W. J., Goshen, Ind.
Armstrong, James A., 1754 Oller St., Regina, Sask., Can.
Armstrong, J. M., 115 1st St., E. Providence, R. I.
Armstrong, Walter, Concord, Mich.
Arnold, John W., 777 W. 10th St., Riverside, Cal.
Ashbrook, Claude L., 3425 Berkeley Ave., Chicago, Ill.
Ashcraft, Watt, 310 Hayne St., Monroe, N. C.
Ast, Jacob F., 1331 Folsom St., San Francisco, Cal.

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Wilson, Robert H., care Parke Davis Co., Detroit, Mich.

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Carmack, R. W., Dana, Ind.
Paul, F. L., Burlington, Ind.
Sanderson, Wm., Sidney, O.
Tiefenthaler, Frank, Cambridge City, Ind.

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